Value Chain Structure, Integration and Performance: The Malt Barley Value Chain in Ethiopia

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FACULTY OF BIOSCIENCE ENGINEERING

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Thesis submitted in fulfillment of the requirements for the Degree of Doctor (PhD) in Applied Biological Sciences: Agricultural Sciences

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Dutch translation of the title: Waardeketenstructuren, integratie en performante: De mout gerst waardeketen in Ethiopië

Suggested way of citation:

Watabaji, M. D 2016. Value Chain Structure, Integration and Performance: The Malt barley Value Chain in Ethiopia. Doctoral dissertation, Ghent University

ISBN-number: ISBN 978-90-5989-964-3

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Acknowledgement

Firstly, I praise God Almighty for providing me the opportunity to do the doctoral degree and granting me the strength to walk through the ups and downs of the long journey towards it, which was indeed as challenging as climbing to the top of the highest mountain. This book appeared in its current shape due to the assistance and guidance of several people and they all deserve my sincere thanks.

I would particularly like to thank my esteemed promoter, Prof Xavier Gellynck. Prof Xavier, please accept my cordial thanks for the extraordinary support, warm encouragements, and complete freedom and flexibility you rendered me to exploit the fullest of potential to produce this doctoral dissertation. Your thoughtful guidance and insightful comments were quite helpful for this achievement. I would also like to extend my words of thank to my co-promoter Dr. Adrienn Molnar who provided me the knowhow of scientific writing. Thank you Adrienn for those insightful discussions, informative emails, and invaluable advices at times of need. Your patience to read and improve the quality of those papers compiled to make this book was immense and thank you for that.

My special words of thank also go to members of the board of examiners, Prof Anita van Landschoot, Prof Benedikt Sas, Prof Marijke D'Haese, Prof Jacques H. Trienekens, and Prof Imre Ferto for the excellent pieces of advice and useful comments the utilization of which has predominantly improved the quality of the final version of the book. Prof. Marijke, I owe you a big credit for the consistent support I have been receiving from you from the time of selecting me for the doctoral training until its completion as you have been coordinating the funding NICHE-ET019 project from the side of Ghent University.

I am also grateful to Dr. Manoj Kumar who was so kin to help me from day one of my arrival in Ghent and enrollment as a doctoral student of Ghent University. Dr. Manoj, thanks for the useful advice of yours in all sorts of affairs, be it academic and personal. On top of that, you and your family have offered me special love and affection which really made me feel at home. Likewise, Dr. Mesfin Tesgaye, his wife Fetiya and their children were so helping and loving for which they will always remain in my heart and memory.

My utmost gratitude goes to Siyblle Maas, Annick Lippens, Marleen De Meyer, and Hannelore Micheils for their wonderful administrative services, and Frederick Van De Casteele for his consistent support on issues related to computer and ICT uses. I would also like to thank Dr. Joachem Schouteten who helped me to translate the summary of this book into Dutch. I would also like to say "thank you" to the founder of OBSG, father Charles, and the administrative staff members of the organization, Annemie, Marleen, and Isabelle for the excellent accommodation they provided me during my stay in Ghent.

I am also grateful to all colleagues in the Department of Agricultural Economics of UGent for the friendly working atmosphere that has been created. But this acknowledgement remains incomplete unless my officemates Dr. Hans De Steut, Dr. Ray Jacobsen, Dr. Binka Kuhne, Dr. Manoj Kumar Dora, Dr. Virginie Lefebvre, Dr. Sara De Pelsmaeker, Dr. Evelien Lambrecht, Dr. Joachim Schouteten, Dr. Joseph Mogendi, Sofie Lagast, Walter Odongo, Joanita Kataike, Ronald Kabbiri, Darian Pearce, Joshua Wesana, Solomon Olum, Joel Juvinal, and Heide Vandenhaute are mentioned. I do not forget the constant support they provided me at times of needs. Thank you all to be such good friends!

I also like to thank my Ethiopian colleagues here in Ghent and back home, who directly or indirectly contributed to the completion of this book. My special thank goes to Dr. Fekadu, Zekaria, and Tinsae with whom I co-moved in the long journey of the doctoral research. Dr. Workneh and Molla, I like to thank you for the humorous chats we have had and for the critical discussions we have made on issues related to this doctoral research. Dr. Jelan and Sisay, you both deserve my words of thank for your assistance on the edition of the Afan Oromo versions of the survey questionnaires. I also want to thank my good friend Ebrahim who prepared a very good design for the cover page.

I am indebted to all the respondents farmers, traders, cooperative staff, managers of relevant core processes of the Assela Malt Factory, the four breweries (Saint George, Meta, Harar and Bedele) and the heads of district offices of agriculture who unselfishly donated their precious time to provide data. It is my pleasure to dedicate this book to Mr. Osman Abrahim, who lost one of his eyes to the stone thrown by a shepherd for the road side while he was driving a car for us to travel from one survey site to another for data collection. That was the most saddening and heinous incident ever faced in my life.

A big credit is owed to my mam Boge Tessema, dad Damie Watabaji, sister Woinitu and three brothers Tolesa, Girma and Abera for their thoughtful decision to send me to school which was far away from our rural village. I appreciate their determination to retain me in schools till the end irrespective of the high demands for labor on farm and the low level of understanding about the value of education. Their material and moral supports were springboards to bounce me high on the scale of achievement.

Finally, I thank my lovely wife, Wesen Assefa, who shouldered the burden of raising our two kids during my absence along with her hectic work at one of the banks in Ethiopia. Dear Wesen, thank you for having faith in me. Without your encouragement and support, this book could not appear in its current form. I know the intensity of your suffering during my absence and you deserve my words of thank and may God Almighty gives you all the best in return. I am also grateful to my lovable daughter Yeron, and my adorable son Nathan. Truly speaking, these kids are the purposes of my efforts and the sources of my joy. I am as well grateful to Prof Chemeda Fininsa, my brother-in-law, his family, and my nephew Esayas Samuel for the care and support they have been giving to my family the whole period of the doctoral research.

Mulugeta Damie Watabaji

Preface

This doctoral research has been undertaken within the framework of the consortium project "Netherlands Initiative for Capacity Development in Higher Education in Ethiopia (NICHE ETH-019)" financed by the Netherlands Organization for International Cooperation (Nuffic). Jimma, Haramaya, Hawassa, and Ambo universities from Ethiopia are beneficiaries and Ghent University from Belgium and Radboud University from the Netherlands are partners in the consortium. The NICHE-ETH-019 project was set out to contribute to the evolvement of vibrant and sustainable agricultural sector in Ethiopia.

The focus of the project is to develop manpower and infrastructural capacities of the four beneficiary universities in Ethiopia so as to enable them support the commercialization process of the agricultural sector in the country. This doctoral dissertation particularly contributes to the specific objective of the project in line with research practice in the area of agribusiness value chain management, one of the few pillars under manpower development as pointed out in the project document.

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List of Abbreviations

AMF	Assela Malt Factory
ATA	Agricultural Transformation Agency
BGI	Brassiere and Glaciers International
CREATE	Community Revenue Enhancement through Agricultural Technology Extension
DAs	Development Agents
EIAR	Ethiopian Institute of Agricultural Research
ESE	Ethiopian Seed Enterprise
ETB	Ethiopian Birr
EUCORD	European Cooperative for Rural Development
KARC	Kulumsa Agricultural Research Centre
MBVC	Malt Barley Value Chain
NVRC	National Variety Releasing Committee
SC	Social Capital
VCG	Value Chain Governance
VCI	Value Chain Integration
VCP	Value Chain Performance
VCS	Value Chain Structure

Chapter 1

Introduction: Conceptual Framework, Research Propositions and Design

1. Introduction: conceptual framework, research propositions and design

1.1. General introduction

In contemporary value chain management literature, different scholars have defined value chain from their own perspectives though the core essence in their definitions is similar. In the view of most scholars, value chain involves three or more individuals and/or organizations that undertake series of *value-adding* activities to bolster the flow of products, services, finance, and knowledge from their origins to their destinations (Kaplinsky and Morris, 2000; Mentzen et al., 2001; Wu et al., 2004; Bagchi et al., 2005; Arshinder and Deshmukh, 2008; Lynch, 2009; Molnár, 2010).

In this doctoral dissertation, the geographic distribution of value chain members and their arrangements within tiers and along the value chain interfaces, the level of information sharing, and the governance of exchange transactions are considered to be among the major constructs of value chain structure (VCS) based on several past studies. For instance, the study by Stock et al. (2000) emphasized on how members' geographic dispersion and distributions within the tiers and along the value chain affect logistic integration. Pagell (2004) studied how the various strategies, communication and information sharing are associated to integration between functional units (purchasing, operation, and logistics). In their study on the role of trust in value chain governance, Ghosh and Fedorowicz (2008) explored the relationships between governance mechanisms and an aspect of value chain integration (i.e. coordination of activities). Moreover, Zhang and Aramyan (2009) formulated the concepts of transaction governance mechanisms and attributes and the interplays between them and value chain performance. The study of Prajogo and Olhager (2012) paid special attention to information quantity, quality, and the frequency of sharing and their association with logistics integration. After a critical review of the frameworks of these past studies, geographic dispersion of members, members' distributions within tiers and along the value chain, information sharing, and transaction governance mechanisms and attributes were identified as key constructs of VCS.

The theoretical foundation of value chain integration (VCI) can be traced to that of Porter's model (Vanpoucke, 2009) in which it is described as a set of activities performed within an organization to create product or service, a "value" of which is measured by prices that buyers are willing to pay. VCI is of a great interest to researchers, value chain members, policymakers, and stakeholders as competitions have already been shifted from between individual members to between value chains (Olhager and Selldin, 2004; Gellynck et al., 2008). Most of the time, terms like integration, collaboration, commitment, and coordination are used interchangeably or complementarily to express the business relationships among value chain members (Arshinder and Deshmukh, 2008; Coa and Zhang, 2010). In the view of Spekman et al. (1998), for instance, there is plenty of literature that shows collaboration, coordination, commitment and even prevalence of joint decisions are manifestations of integration. Bolstering the inclusiveness of the word "integration", Pagell (2004) posited that encompasses the wider aspects of value chain management.

In this doctoral dissertation, VCI is defined in terms of four key constructs, these are: collaboration among value chain members by way of sharing resources, capabilities, and risks as if the members belong to a single entity (Arshinder and Deshmukh, 2008; Coa and Zhang, 2010); commitment towards long-term relationships; coordination of various (i.e. purchasing, operation and logistics) activities along the value chain interfaces through harmonized database (Gimenez and Ventura, 2005; Slone et al., 2007; Richey Jr et al., 2009); and joint decision making on key operational and strategic issues such as product specifications and pricing, capacity building, and technology selection and so forth (Mentzen et al., 2001; Fawcett and Mignan, 2002; Li et al., 2009; Villena et al., 2009; Flynn et al., 2010). Value chain performance (VCP) is one of the core constructs in this doctoral dissertation. In the view of Molnár (2010), VCP can be defined as the degree of accomplishment of value chain goals, though the goals vary from value chain to value chain. Based on past studies, we conceptualized VCP in terms of its key indicators: quality, responsiveness, flexibility and efficiency (Aramyan et al., 2007; Zhou and Benton Jr, 2007; Molnár, 2010; Fattahi et al., 2013).

Many authors indicated that constructs of VCS influence VCP without making any reference to VCI (O'Leary-Kelly and Flores, 2002; Pagell, 2004; Sheu et al., 2006; Tummala et al., 2006; Vaart and Donk, 2008; Kim, 2009; Rajaguru and Matanda, 2009; Villena et al., 2009; Prajogo and Olhager, 2012). In the absence of VCI, higher VCP can hardly be achieved or sustained even if achieved incidentally (Pagell, 2004; Villena et al., 2009). On the other hand, Ho et al. (2002) and Vanpoucke (2009) doubted the existence of positive relationships between VCI and VCP. In the view of Stock et al. (2000) and Gagalyuk and Hanf (2011), research findings that associate VCS to VCI are scarce and studies conducted under this doctoral research would bridge this literature gap.

Towards that end, this doctoral research aims to investigate the interplays between VCS and VCI constructs and between VCI constructs and VCP based on empirical data sets obtained from the MBVC. This was identified for this doctoral research due to its (1) many years of operation (Flynn et al., 2010), (2) complex structure with wide vertical and long horizontal arrangements of its members, (3) significant contributions to the socio-economic development of Ethiopia, (4) importance as a source of livelihood for millions of individual members at various interfaces of the chain, and (5) importance in satisfying the needs of end users through successive value additions along the value chain tiers.

1.2. Research justification

1.2.1. Gaps in prior research

As indicated earlier, several studies have been conducted in the area of VCI, questions like how VCI can be conceptualized, how its constructs are influenced by constructs of VCS and influence VCP both at value chain member's and/or overall value chain's levels still need further investigations to come up with satisfactory answers. The types of constructs of VCS and the levels of their influences on VCI and the types of constructs of VCI and the levels of their influences on VCP varied from context to context. The fact that this doctoral research focuses on the MBVC in Ethiopia, an agribusiness value chain operating in a developing Sub-Sahara

African country adds to the relevance of this study as it provides new perspective, both from chain and country contexts.

Secondly, despite the popularity of the term "VCI" both in academia and the real practical environments, there is still a considerable confusion on its conceptualization (Mentzen et al., 2001). In some cases, VCI is understood as a structure whereby two or more members are organized under the umbrella of a single ownership structure to add value in the form of products and/or services while others define it as a level of control that runs from the one end where there is no control (spot-market) to the other end where there is a complete control (hierarchical) all along the continuum. Moreover, researchers did not reach consensus yet as to how to measure the strength of VCI. For instance, in the study of Pagell (2004), integration among functional units was measured with the frequency of interactions among those functional units, level of collaboration, and mutual acceptability of outcomes as key indicators. Cousins and Menguc (2006), on the other hand, measured VCI in terms of whether activities are jointly planned and managed, even though modest achievement of plans may not necessarily imply strong VCI. Therefore, there is still a need for additional study to further clarify the ambiguities around constructs and their indicators and to select more suitable ones specifically in the context of a developing country where value chains are infant.

Thirdly, it is obvious that efforts towards VCI would not bear fruits unless all integration barriers are identified and counteracting remedial measures are taken (Fawcett et al., 2008) but research findings are scanty in this area (Richey et al., 2010). Similarly, Pagell (2004) indicated the lack of sufficient scientific literature on barriers to VCI. In the view of Fabbe-Costes and Jahre (2008) further research should be conducted on VCI and its influences on VCP as empirical evidences hitherto are insufficient. Olhager and Selldin (2004) and Sheu et al. (2006) expressed the same view that further study should be conducted to investigate how VCI constructs influence VCP to judge if investment in it would payback. Empirical studies that conceptualize the sequential interplays among constructs of VCS, VCI and VCP are scanty (Wu et al., 2006).

Fourthly, as indicated by Molnár (2010) and Vaart and Donk (2008) only limited number of research findings bolster the existence of positive interplays between VCS and VCI and between

VCI and VCP at broader value chain level and even most of these findings are limited to dyadic interactions of focal chain members with either their immediate suppliers or customers, not with both simultaneously. Further research on the relationships between constructs of VCS and VCI, and between constructs of VCI and VCP that involves multiple interfaces are relevant since such empirical evidences are still scarce.

1.2.2. Contributions of the research

This doctoral research is motivated to make remarkable contributions in areas of value chain management in general and around VCS, VCI and VCP constructs in particular in terms of scientific knowledge accumulation and policy implications to improve clarify on the concepts of VCS, VCI and VCP and to improve situations in the MBVC in Ethiopia. The value chain structure-integration-performance paradigm in such a comprehensive manner is the new approach introduced in this doctoral study. Under this section, we described the scientific contributions and practical relevance of the studies compiled to form this doctoral dissertation.

1.2.2.1 Scientific contributions

There are three major categories of scientific contributions to which this doctoral research would contribute its fair share to the value chain management literature. The contributions are grouped into conceptual, methodological and empirical categories.

1.2.2.2 Conceptual contributions

This doctoral dissertation conceptually contributes to the scientific literature of value chain management in general and to the value chain structure, integration and performance in particular. On the other hand, it further enriches the scientific literature within the framework of the relevant theories identified to underpin the formulated conceptual frameworks used in various studies reported in this doctoral dissertation, namely: transaction cost analysis (TCA), social capital (SC) and resource based view (RBV). The patterned arrangements of concepts into the conceptual framework that links VCS, VCI and VCP constructs makes important conceptual contribution of this doctoral research. The investigation of the interplays between VCS

constructs and VCI and between VCI constructs and VCP is also significant conceptual contributions.

The value chain structure-integration-performance paradigm and the concepts used under each of the constructs the conceptual framework, and the links drawn among the various constructs of the framework are the key conceptual contributions of this doctoral research. Studies in the past paid more attention to the direct relationship between VCS constructs and VCP while they pay no or little attention on how VCI constructs are related to both VCS and VCP constructs . This doctoral research made important contribution towards the conceptualization of VCI mostly in terms of how it is influenced by VCS variables on the one hand and how its constructs influence VCP outcomes on the other hand. In the view of Bagchi et al. (2005), for instance, the definition given to the term VCI is incomplete as it is limited to either information sharing, or inventory management, or inventory distribution, or value chain designs or collaboration on R&D activities alone, and such narrow scopes. Since we defined VCI to mean collaboration among members, commitment of members, coordination of activities and participation of members in decisions at various value chain interfaces, this definition is more complete than the ones provided in the past and can be counted as a key conceptual contribution. Whereas, the most specific conceptual contributions in relation to specific each study were provided in the specific chapter allotted to that particular study.

1.2.2.3 Methodological contributions

The identification of objectively measurable indicators for VCS, VCI, and VCP constructs is the core methodological contribution of this doctoral dissertation. Though most of these objectively measurable indicators were extracted from the literature, they were arranged and organized to well-structure the formulation of survey questionnaires and interview guides for the various members of the MBVC which is another important methodological contribution of this research as these instruments can replicated in future studies. Moreover, the various statistical methods used throughout the various studies presented in this doctoral dissertation to test the validity and reliability of our data sets and to investigate if the proposed positive associations between constructs of VCS and VCI and between constructs of VCI and VCP hold true are all in

accordance with the generally accepted practice of scientific inquiry. We employed standardized exploratory (qualitative) research methods to generate useful data to formulate researchable propositions and to propose specific hypotheses, while acceptable conclusive (quantitative) methods were used to investigate the validity of the propositions and hypotheses.

1.2.2.4 Empirical contributions

This doctoral dissertation makes a significant empirical contribution while it investigates the influences of VCS constructs on VCI and that of VCI constructs on VCP based on the primary data obtained from members of the MBVC in Ethiopia, a representative chain for agribusiness value chains from Sub-Sahara Africa. A wide empirical research gap still exist regarding identification of suitable VCP indicators due to limited past efforts to generate practical and context specific indicators (Gunasekaran and Ngai, 2004; Molnár, 2010). Most studies done in the past along the VCS-VCI-VCP paradigm were based on empirical data obtained from the developed part of the world, as empirical evidences from developing countries are scanty (Chin et al., 2014). Therefore, the primary data generated for the purpose of our studies can make an important empirical contributions from the agribusiness value chain operating in a developing country. Whereas, the most specific empirical contributions in relation to specific each study were provided in the specific chapter allotted to that particular study.

1.2.2.5 Practical relevance

The MBVC integration whose strength is influenced by the constructs of its structure and whose constructs influence its performance is the main theme of this doctoral research due to its prominence in terms of what it corroborates to the literature with its predicted new findings based on empirical evidences as a new source. In addition to its scientific and methodological contributions, the findings of this doctoral research would implicate to the members and stakeholders of the chain several clues as to how to improve the strength of the chain's integration to enhance performance. In this dissertation, the practical implications of each study were presented under the conclusion section of the specific chapter devoted to the particular study.

1.3. Conceptual framework and underlying theories

Under this section, the guiding conceptual framework of this doctoral research was presented. The framework presented under **Error! Reference source not found.** visualizes the key conceptual constructs used to explore the MBVC structure, integration and performance to help us investigate the interplays between VCS constructs and VCI and then between VCI constructs and VCP. We identified relevant theoretical concepts to underpin our research and social gaps and presented brief explanations these theories under section 1.3.2.

1.3.1. Conceptual framework

On the basis of thorough review of salient literature and relevant theories, the general conceptual framework was formulated to guide this doctoral research, see Figure 1. The central theme of our framework is the VCS - VCI - VCP paradigm together with its conceptual constructs within the context of the MBVC in Ethiopia. In her doctoral research, Molnár (2010) defined structure as a design through which a given entity is administered, including the lines of authority and communication between the different administrative units of an entity, the flows information and data through these lines of communication and authority. Based on this definition of structure, information sharing between value chain members is chosen as one of the constructs of VCS. Moreover, the geographic dispersion of value chain members, their distribution within the various tiers and along the value chain, the transactions governance mechanisms are considered as constructs of VCS (Stock et al., 2000). The conceptual framework depicted under Figure 1 envisages positive relationships between the above constructs of VCS and VCI. As indicated earlier, VCI refers to the level of collaboration among value chain members in terms of sharing resources, capabilities and risks; the degree of value chain members' commitment towards long-term relationships; and the intensity of coordination of activities and decisions at every interfaces. Although these constructs of VCI are complementary to one another (Pagell, 2004), each of them still explains different aspects of VCI as explained in this dissertation.

Based on past studies, these constructs of VCI are conceptualized to positively influence VCP which is measured in terms of product and/or service quality, value chain members' responsiveness to requests of customers, their flexibility to cope up with various changes, and operational efficiencies which are suggested as good indicators of performance (Vickery et al., 2003; Droge et al., 2004; Gellynck et al., 2008; Zhao et al., 2008; Villena et al., 2011; Wu et al., 2014).

The conceptual framework presented under Figure 1 is adapted from past studies. For instance, Stock et al. (2000) used similar framework to study the fits between VCS and VCI to deliver higher VCP, though the context of the study is logistics operations; Pagell (2004) studied factors that influence integration using similar constructs of structure, integration and performance but with special reference being made to functional units within a single firm; Molnár (2010) formulated similar conceptual framework in her study on supply chain performance and relationship though structure is conceptualized to encompass both integration and governance in her case; and Ghosh and Fedorowicz (2008) also formulated a conceptual framework that links governance, coordination and performance constructs which still falls within the structure-integration-performance paradigm of this doctoral dissertation.

Moreover, similar research framework was used by Prajogo and Olhager (2012) in which case concepts of information technology use (i.e. channels use in our case) and information sharing (i.e. both volume and quality of information shared) were hypothesized to have positive relationship with logistic integration which we have broadened to VCI in this doctoral research.

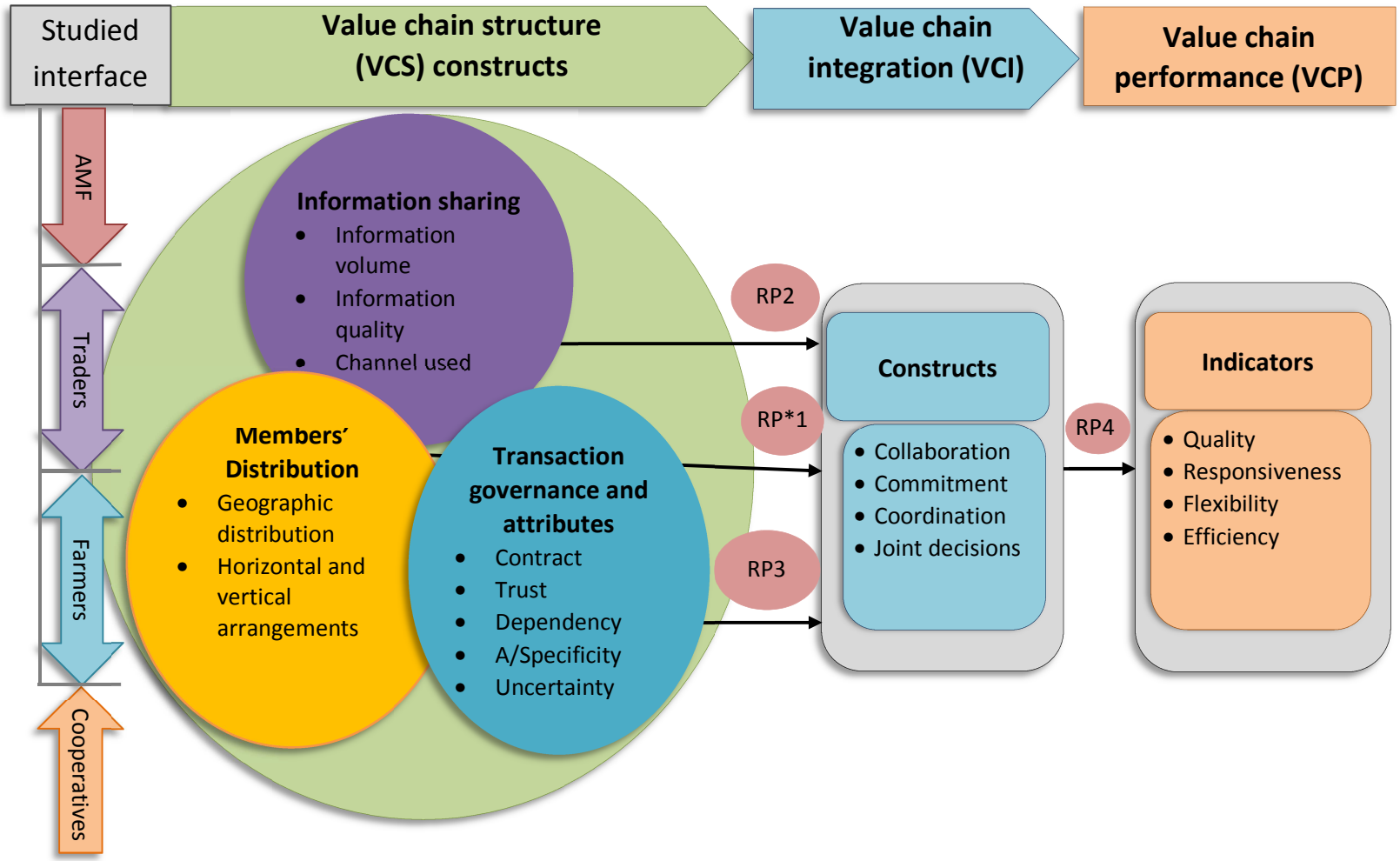


Figure 1: Value chain structure, integration and performance (a conceptual framework)

Source: Own compilation based on past studies (Stock et al., 2000; Pagell, 2004; Ghosh and Fedorowicz, 2008; Molnár, 2010; Prajogo and Olhager, 2012)

PR*1 = Research proposition 1

1.3.2. Underlying theories

The complexity of value chain concepts makes it difficult to fully explain the subject with the help of just a single theory. Thus, concepts from strategic management, institutional economics, organization theory, marketing, and sociology were combined to fully address concepts of VCS, VCI and VCP in the context of the MBVC. In particular, three prominent theoretical perspectives: Transaction Cost Economics (TCE), Social Capital (SC), and Resource Based View (RBV) are identified as the most relevant theories to build our conceptual framework and to underpin our research propositions. The purpose of identifying the underlying theories was initially to borrow concepts from them to support our conceptual framework, to formulate our research propositions and also to frame our survey questionnaires and interview guides. In the end, the key findings of the doctoral research would make important contribution both conceptually and empirically to further develop these theories. We have provided vivid explanations of these theories under sections 1.3.3.1 to 1.3.3.3.

1.3.3.1 Transaction cost analysis

The main essence of transaction cost analysis (TCA) is to explain the suitability of transaction governance mechanisms within a given context of exchange situation to gain comparative advantage over competitors. The basis of TCA consists of the fact that interactions between value chain members to establish exchange transaction have costs attached to them (Molnár, 2010). Transaction costs can be decomposed to four separate components of exchange transactions. These are: (1) searching costs, (2) contracting costs, (3) monitoring costs, and (4) reinforcing costs (Williamson, 1985; Dyer, 1997). The first three are called *ex ante* while the last one is *ex post* transaction costs. *Searching* costs are costs incurred to gather information about trading partners who are mostly members of the same value chain to evaluate their exchange potential; *contracting* costs are costs associated with negotiation and contract preparation and signing by trading partners; *monitoring* costs are costs incurred to ensure that contracting party would perform the contractual requirements; whereas *reinforcing* costs are costs of bargaining and sanctioning of contracting partners when they fail to perform according to the terms stipulated in the contract.

This theory deals mainly with the choice of effective VCG mechanisms from the menu of several mechanisms lying on a continuum between the two extreme ends of VCG structure, a spot market and a hierarchical (Williamson, 1991). The personal characteristics of value chain members (i.e. bounded rationality and opportunistic behavior) and the attributes of exchange transactions (i.e. asset specificity, uncertainty and frequency) are important factors that determine the choice of governance mechanisms (Slangen et al., 2008). For instance, Trienekens (2011) suggests to follow spot-market governance structure when transaction costs are low; otherwise long-term contracting or hierarchical governance structure is appropriate to minimize transactions costs.

Since transaction governance and information sharing are among constructs of the conceptual framework of this doctoral research, some of the concepts in this theory are identified to be relevant inputs for the formulation of our conceptual framework and researchable proposition. As it was indicated earlier, the essence of TCA is to properly organize exchange transactions to avoid or at least minimize transactions costs through the use of effective value chain governance mechanisms. Based on the fact that transaction costs theory focuses on how to organize exchange transactions through effective combination of transaction governance mechanisms and attributes, I contended that the key constructs of our conceptual framework for this doctoral dissertation found their roots in TCA concepts. Therefore, TCA provides the base to study the integrative roles of transaction governance mechanisms and attributes in the context of MBVC in Ethiopia. Moreover, TCA provides better insights about the importance of information sharing along the value chain. In the view of (Williamson, 1985), for instance, uncertainty refers to the lack of knowledge about the exchange environment and it can be tackled when value chain members share sufficient quantity and quality information. Therefore, the study that aimed at the investigation of integrative role of information sharing constructs in the context of the MBVC in Ethiopia utilized concepts of transaction cost theory.

1.3.3.2 Social capital theory

The social capital (SC) can be realized only when value chain members make valuable assets accessible to other value chain members (Granovetter, 1985, 1992). This can happen when

there is an already built good relationships among these value chain members. It has three dimensions. These are: (1) the *cognitive* dimension which refers to the extent to which value chain members share their cultures and goals to one another; (2) the *relational* dimension which refers to the level of trust, friendship, respect and reciprocity existing between value chain members; and (3) the *structural* dimension which refers to the level of social ties established between value chain members. In this doctoral dissertation, relational dimension is regarded as one of the key elements of VCG, which is a construct under VCS.

The concepts of this theory are used to build the constructs of VCG and how these constructs influence VCI. Therefore, social capital theory has been identified as one of the fundamental theories to build the conceptual framework and researchable propositions of this doctoral research. The social capital theory provides us the base to study the relationship between VCG constructs and VCI. More specifically, social capital lays the theoretical foundation to investigate the association between relational governance (i.e. trust) and VCI within the context of the MBVC which is the focus of the study reported in the fourth chapter of this doctoral dissertation.

1.3.3.3 Resource Based View (RBV)

Based on the view of Vanpoucke (2009), we used the resource based view (RBV) to develop our conceptual framework in this doctoral dissertation as it supports the configurational view of VCI. According to this theory, resources are both tangible and intangible assets and capabilities that allow value chain members to grasp opportunities and avoid threats (Changular-Smith et al., 2012). The very reason for value chain members to collaborate is the desire to pool and utilize heterogeneous resources in the manner that creates competitive advantage for the whole value chain and every individual chain member. In the view of Helfat and Peteraf (2003) resources are assets, both tangible and intangible that are owned, controlled and/or accessed permanently and semi-permanently under the auspices of strong VCI. In order to improve the competitiveness of value chain, a strong collaboration among value chain members should be established so as to create portfolios of heterogeneous assets which cannot happen, otherwise.

In the view of Fortuin (2007), two assumptions are made under RBV: (1) the resources must vary significantly among value chain members, which is known as *resource heterogeneity*, and (2) the heterogeneity of resources should last longer before it is imitated by others, which is termed as *resource immobility*. Since the analogy of VCI is to combine resources in a unique way to create competitive advantage through synergy for the entire value chain (Villena et al., 2009), the RBV theory is highly relevant and was included in theoretical framework of this doctoral research.

On the other hand, knowledge of the value chain members is a crucial resource (i.e. intangible capability as stipulated in RBV) to strengthen integration and improve performance of the value chain. The knowledge of one value chain member can be used by other value chain members when sufficient quantity and quality of information to transfer this knowledge. Therefore, RBV lays some theoretical foundation to investigate the interplays between information sharing constructs and VCI in the context of the MBVC which is focus area of the study presented in the third chapter of this doctoral dissertation.

1.4. Research objectives and propositions

The objectives of this doctoral research are to: *(1) assess the present situations of the MBVC in Ethiopia within VCS-VCI-VCP paradigm; (2) investigate the interplays between information sharing constructs and VCI; (3) investigate the relationship between value chain governance constructs and VCI; (4) investigate the relationship between VCI constructs and VCP; and (5) hint important policy implications in areas of MBVC integration and performance*.

We formulated key research propositions in line with the above objectives. The vivid explanations of the propositions are provided in the paragraphs that follow and they are thoroughly investigated in separate subsequent chapters dedicated for that particular purposes in the dissertation.

1. **The distributions of value chain members across geographic areas and within and along the value chain tiers negatively relate to VCI**

In this doctoral dissertation, the distributions of value chain members across geographic areas and within and along the value chain tiers were considered as constructs of VCS. The distribution of value chain members across geographic areas alludes to locational dispersion of these members over different geographic areas. Whereas, value chain members' distribution within a single tier and along the value chain tiers also forms the vertical and horizontal structure of the value chain. More specifically, vertical structure refers to the arrangements of value chain members within a single tier which forms either a narrow-vertical structure with less number of members or a wider-vertical structure with more number of members within that particular tier (Lambert and Cooper, 2000). The horizontal structure, on the other hand, refers to the number of tiers connected to one other to form a long-horizontal structure with many tiers or a short-horizontal structure with few tiers all along the value chain tiers. By definition, VCI is a cross-functional and -boundary affairs and often difficult to achieve for value chains with longer horizontal and wider vertical structures and relatively easier for value chain with shorter horizontal and narrower vertical structures.

This proposition is further investigated under *chapter 2* using qualitative holistic case study approach. Under this research proposition, we elaborate on constructs of VCS by way of providing answers to questions like how MBVC members disperse across the wider geographic areas; how wide is the vertical structure and how long is the horizontal structure of the MBVC, and how the distributions of the MBVC members across geographic areas and their arrangements within and along chain's tiers relate to VCI. The second chapter, in fact, goes beyond the scope of this propositions and assess the situations of the MBVC to provide sufficient practical background for all research propositions treated in this doctoral dissertation.

2. Information sharing between the value chain members positively relates to VCI

The members of matured value chains have established information systems that ease the collection, processing and storage of sufficient volume and good quality information in a centralized database so that it can easily be retrieved by individual value chain members at every interface. The use of such a database promotes VCI as it allows the flow of sufficient volume and good quality information along the value chain interfaces and enhances members' knowledge about situations of other value chain members and the operations of the entire value chain (Changular-Smith et al., 2012). When sufficient volume and good quality information is shared across functional and organizational boundaries, trust is built among value chain members and commitment of value chain members towards long-term relationships would increase (Fawcett et al., 2007).

By information volume, we refer to the level of details and the variations of the information being shared between value chain members to strengthen VCI. Among the various types of information that are shared between value chain members, Du et al. (2012) and Pandey et al. (2010) indicated that inventory balances, demand forecasts, sales and order status, and production schedules are extremely important to support the decisions of value chain members. In the view of Leat and Revoredo-Giha (2008) information on performance indicators like quality standards, customer requirements, market conditions, good practices are important to share between value chain members. Information quality, on the other hand, refers to the accuracy, timeliness, and reliability of the information being shared (Tummala et al., 2006; Li et al., 2009; Du et al., 2012).

Among the long list of benefits obtained from information sharing between value chain members, cost reduction, strong integration along value chain tiers, and fast order fulfillments are the most common ones. In fact, all value chain members do not have the same capacity to generate and share same brand of information in terms of volume and quality. Hence, focal value chain member or members should play a lead role to stimulate smooth flow of sufficient volume and good quality information along the value chain interfaces.

In the context of value chains, multiple communication channels use is an option to support smooth flow of information. Through these communication channels, future demand forecasts in addition to current price/cost figures are shared to establish harmonious working relationships between value chain members, the ultimate goal of which is maximization of the overall VCP (Tummala et al., 2006). When value chain members are dispersed over a wider geographic areas, VCI gets weaker, unless otherwise, value chain members are interconnected with advanced information sharing networks (Gunasekaran and Ngai, 2004).

When sufficient volume and good quality of information is shared between value chain members, it is easier for them to know each other's situations (Christopher and Sara, 2004; Prajogo and Olhager, 2012) which culminates in the creation of stronger VCI (Ging et al., 2010). When such information is shared, it eases collaboration between value chain members, enhance commitments of value chain members towards long-term relationships, foster coordination of activities along the value chain interfaces and ease joint decision making on key operational and strategic issues.

The focus of past studies was more on the influence of information sharing on VCP outcomes than on VCI. For instance, Slone et al. (2007) posit that information sharing between value chain members brings a breakthrough improvements to VCP outcomes. It is still logical to propose that strong VCI leads to higher and sustainable VCP as research findings are scanty to underpin the existence of such a relationship.

This proposition is taken up in *chapter 3* for in-depth analysis and investigation using appropriate quantitative and qualitative methods of data analysis. Under this research proposition, we mainly raised and discussed research questions like: which types of information are shared between value chain members and to what level of detail; which communication channels are commonly used for information sharing, how sufficient is the volume and high is the quality of information being shared between value chain members; and what relationships do exist between information sharing constructs (i.e. volume and

quality of information and extent of communication channels use) and VCI within the context of the MBVC in Ethiopia.

3. Transactions governance mechanisms and attributes positively relate to VCI

According to Ponte (2007) and Menard (2006) transaction governance is the process of organizing transactions to attain higher VCP outcomes through proper coordination of activities along the value chain interfaces. It involves rule setting to regulate members' participation in the value chain and to monitor members compliance. An important questions in this regard could be as to who should set, enforce and follow these rules given the dynamism of power distribution among value chain members (Kaplinsky and Morris, 2000).

In the view of Gereffi et al. (2005), there are five basic types of governance structure in the value chains to organize exchange transactions between buyers and sellers of products and services. These are: spot-market, modular, relational, captive, and hierarchical. In their comprehensive study, Gellynck and Molnár (2009), Schiefer et al. (2009), and Peterson et al. (2001) classified transaction governance structure into seven, namely: spot-market, non-contractual relationship with non-qualified partners, non-contractual relationship with qualified partners, contractual-relationship, relation-based alliance, equity-based alliance, and vertical integration. In this doctoral dissertation, contract and trust were considered as VCG mechanisms to tailor the level of analysis to the context of the MBVC in Ethiopia. According to Gereffi et al. (2005), the levels of complexity and uncertainty in the exchange environment, the degree of dependency of value chain members on value chain partners, the level of asset specificity would determine the choice of transaction governance mechanisms though these transaction attributes were not associated with VCI in past studies.

Therefore, this proposition is taken care of *in chapter 4* in much more details. In the fourth chapter, issues related to of contract use and social relationships (i.e. trust) between value chain members at various MBVC interfaces were elaborated and their relationship with VCI

were assessed. Moreover, the prevalence of transaction attributes (i.e. levels of value chain members' dependency on their value chain partners, the extent of assets specificity, and the degree of uncertainties in the exchange environment) were assessed and their interplays with VCI investigated. Finally, the influences of transaction governance mechanisms and transaction attributes on VCI were investigated.

4. VCI positively relates to VCP

The strength of VCI can be measured by the average numbers of interactions between value chain members within the given time period (Vaart and Donk, 2008). Throughout this doctoral dissertation, collaboration among value chain members by way of sharing resources, capabilities, and risks; coordination of activities along the value chain interfaces, commitment of value chain members towards long-term relationships, and joint decision making on key operational and strategic issues are considered to be core conceptual constructs of VCI.

As indicated earlier, various indicators can be used to measure VCP at individual value chain member-level and/or chain-level. In the view of Rajaguru and Matanda (2009), for instance, indicators related to business operations, financial flows and responsiveness are used to measure VCP at chain's level. On the other hand, Cao and Zhang (2010) used more specific indicators such as sales volume, return on investment, and profit margin for VCP measurement. Many authors suggested the use of inventory balances, order fulfillment, quality, customers' satisfaction, and value chain members innovativeness to measure VCP in the value chain settings (Ramdas and Spekman, 2000; Kim, 2009; Jiang et al., 2012). Similarly, Aramyan (2007) and Van Der Vorst (2000), measured VCP in terms of customers' satisfaction which in turn depends on the fulfillment of customers' needs.

Several scholars noted the existence of positive relationship between VCI constructs and VCP both at individual value chain member- and chain-levels (Narayanan and Raman, 2002; Pagell, 2004; Rajaguru and Matanda, 2009; Villena et al., 2009; Richey et al., 2010). In the

views of these scholars, VCI constructs lead to efficient delivery of goods and/or services to consumers which is an important aspect of VCP.

This proposition is explored in *chapter 5*. In the fifth chapter, we identify and further organize the concepts of VCI and VCP through rigorous literature review for better clarification of the concepts within the realm of value chains in general and MBVC in particular and then investigate how key constructs of VCI influence VCP which was measured using quality, responsiveness, flexibility and efficiency as indicators.

1.5. Research design and structure of the dissertation

1.5.1. Research design

1.5.1.1 Research scope

This doctoral research was limited to the MBVC in Ethiopia. Farmers- and traders-respondents for the field survey were selected from four districts in Arsi and West Arsi zones of the Oromia regional state. The districts were selected due to the wider area coverage and higher marketable surplus of malt barley they produce (Legesse et al., 2007; Kassahun, 2011) and based on information obtained from the Assela Malt Factory, henceforth AMF. The four districts are *Tiyyo* and *Lemu-Bilbilo* from Arsi Zone and *Kofele* and *Shashemene* from West Arsi Zone. Key informants for qualitative interviews were selected from farmers, traders and cooperatives staff in those districts and managers of related operations at AMF and four breweries namely: Saint George brewery, a full subsidiary of the Society for Brassiere and Glaciers International Plc. (BGI); Meta-Diageo brewery, a full subsidiary of Diageo Plc and, Bedele and Harar breweries, both full subsidiaries of the Heineken N.V., see Figure 2 for geographic distribution of these members. The local coordinator of MBVC improvement program of Self Help Africa, an NGO, and managers of related operations at the Ethiopian Seed Enterprise, henceforth ESE, were also interviewed. In terms of issues covered, the scope of the doctoral research was limited to constructs of VCS, VCI, VCP and the sequential interplays between these constructs within the context of the MBVC in Ethiopia.

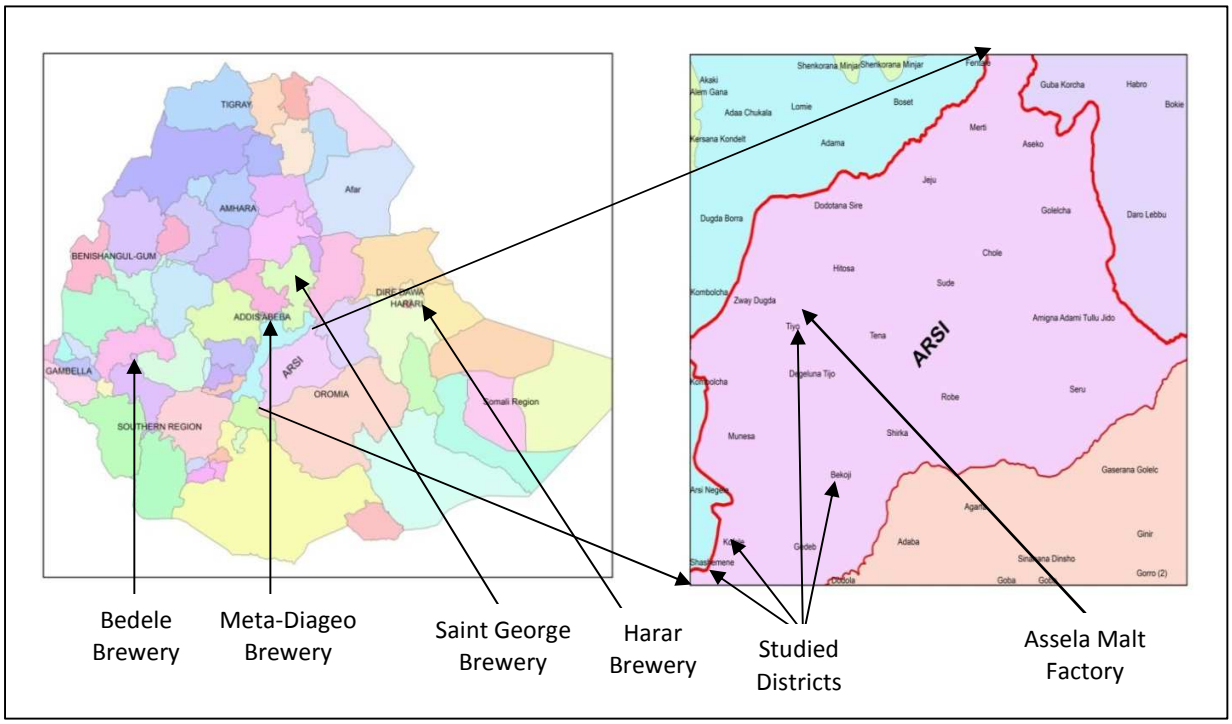


Figure 2: Geographic scope of the study

1.5.1.2 Sampling and data collection

For this doctoral research, both exploratory and conclusive data collection methods were used, see Figure 3. Similar to the studies by Bastl et al. (2012) and Herrmann and Brüntrup (2010), we employed a multistage sampling techniques to select districts, farmers- and traders-respondents, and key informants from among members of the MBVC in the various tiers of the MBVC in Ethiopia. We drew samples of farmers from the highlands of four districts of Arsi and West Arsi zones where malt barley is a predominantly and widely grown crop (Legesse et al., 2007). From each selected district, random sample of 80 farmers were systematically drawn whereby the k^{th} farmers from the list of each sampling-frame were included in the sample, after the starting point being was randomly selected from the first interval in the list of the sampling-frame. We obtained lists of farmers, our sampling-frames, from the malt factory and respective district office of agriculture. These sample sizes of farmers were drawn from four selected districts and constitute from 10 to 20 percent of the total malt barley growing farmers in the sampling-frames.

In addition, we approached 25 willing traders in each study districts and a total of 100 traders have filled the survey questionnaire. Since there are few traders in towns of the selected districts and all traders were approached and the willing ones have filled the survey questionnaire which was nearly a complete census in the case of traders. A systematic sampling technique could not be used to select samples for traders since lists of malt barley traders are not available both at the malt factory and/or in district offices and there are also few traders participating in the chain as compared to farmers.

Moreover, key informants for qualitative interviews were purposively selected from among farmers, traders, cooperatives staff, and managers of the malt factory and breweries to included members who are more amenable and have good level of understanding about the structure, integration and performance of the MBVC in Ethiopia.

For this doctoral research, combination of multiple techniques of secondary and primary data collection such as field survey, qualitative interviews, reviews of literature and desk review of archives were employed. In addition to thorough review of literature, secondary data were also compiled from sources like policy documents and directives, working papers and manuals, contractual agreements, operational plans and budgets, and reports of various MBVC members and other stakeholders.

In conjunction with extensive literature review and multi-method empirical research approaches, the observations of the doctoral student during field survey and experience previously gained while working as a member of an administrative board of one of the studied breweries, as well, were good inputs for the studies reported in this dissertation (Roethlein and Ackerson, 2004).

Before going for the full-scale data collection, separate questionnaires and interview guides were crafted for each group of members of the MBVC in Ethiopia. A survey questionnaire for farmers was initially prepared in English and then translated to Afan Oromo, a local language commonly spoken among farmers, and then re-translated to English so as to verify the correctness of interpretations of concepts during translation and to improve its clarity. Since

traders speak different languages, we preferred to hire multilingual and experienced enumerators who can easily translate the English version questionnaire to the language preference on spot while traders fill the questionnaire. Whenever situation allows, it is good to administer the English version of the questionnaire as it would prevent possible interpretation errors (Vanpoucke, 2009).

The survey questionnaires were designed in Likert-scale, dichotomy and multiple responses forms (Olhager and Selldin, 2004). The survey questionnaires and interview guides were pre-tested with few farmers and traders in months of April and May, 2013 to ensure content validity (Narasimhan and Nair, 2005). Enumerators were given a one day training on contents of the survey questionnaire and how to administer the questionnaires. As suggested by Paulraj et al. (2008), the structure, readability, clarity and completeness of the instruments were also reviewed by senior researchers in our *Agro-food Marketing and Chain Management Division* of the Department of Agricultural Economics at Ghent University. We improved the validity and clarity of these instruments by making some changes to the wordings, contents, arrangements, and overall structure based on feedbacks obtained from the pilot test and comments received from the researchers (Vanpoucke, 2009; Ji et al., 2012). Survey data were elicited during the months of June, July and August, 2013 with the help of enumerators under close supervision of the doctoral student.

This doctoral research has also utilized data collected through qualitative interviews with some selected MBVC members alongside the field survey. A total of 76 qualitative interviews were conducted out of which 27 were with farmers; 13 were with traders; 17 were with cooperatives staff, 5 were with managers of AMF, 11 were with managers of breweries, 2 were with managers of the Ethiopian Seed Enterprise (ESE) and 1 was with the coordinator of MBVC project funded by the Self Help Africa to complement and triangulate survey data and at the same time to establish a broad-based understanding of issues related to topics under investigation (Fawcett and Magnan, 2001).

While identifying key informants for qualitative interviews, we gave much emphasis to the knowledge of the members on the operations and strategic directions of the MBVC and their

years of participation and experience in the chain (Molnár, 2010). The doctoral student had conducted all interviews using structured and pre-tested interviews guides to contain the discussion within the scope and focus of the study (Roethlein and Ackerson, 2004; Tessema, 2012). Each interview was electronically recorded and transcribed verbatim. All qualitative interviews lasted between 45 minutes and 2 hours.

We promised to keep the confidentiality of the data and anonymity of names of respondents and informants in order to build respondents' and informants' confidence and to grant ourselves the necessary assurance to collect reliable data. The specific research design and data sources for this doctoral research are clearly depicted in Figure 3.

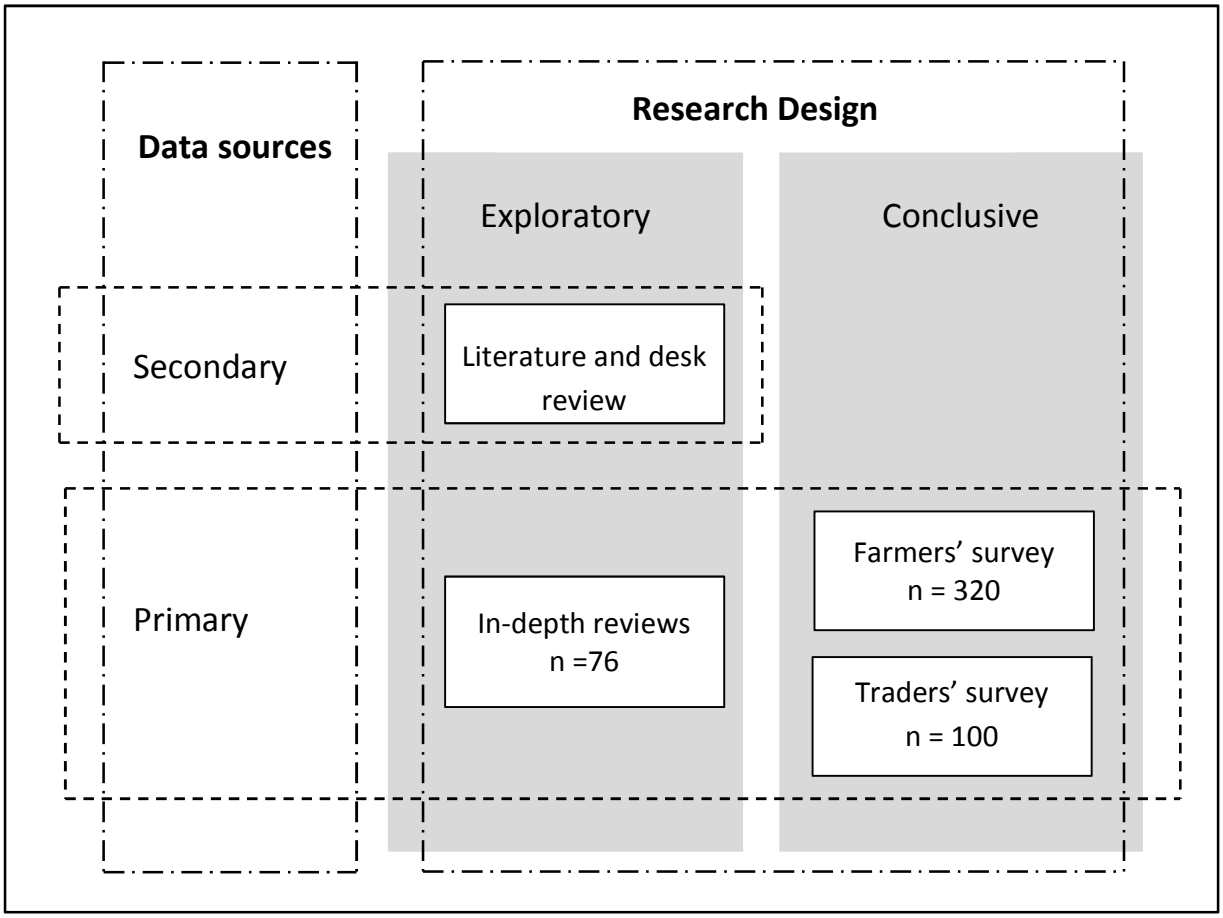


Figure 3: Research design, data sources and methods of collections
Source: own compilation

1.5.1.3 Data Analysis

Based on the nature of our research propositions and formulated hypotheses and the type of data generated, appropriate qualitative and/or quantitative methods of data analyses were identified and used. Combinations of descriptive statistics and advanced data analyses techniques such as explanatory factor analysis (EFA), ordered logistic regression (Ologit), and structure equation modelling (SEM) were employed to investigate the validity of our conceptual constructs/indicators and the consistency of data set and to attest the existence of proposed interplays between constructs. The detailed methodology adopted for each specific research proposition is described in the chapter allotted for the proposition.

1.5.2. Structure of the dissertation

This doctoral dissertation is organized into six chapters, see Figure 4. The introductory chapter, which is the first chapter of the dissertation, begins with brief overview of the interplays between VCS constructs and VCI and between VCI constructs and VCP based on past studies to lay a foundation for the conceptual framework of this doctoral research. This chapter presents the research objectives, propositions and contributions, both scientific and managerial, of the doctoral research. The chapter closes by providing a brief background information about the MBVC in Ethiopia, which is the case of the analysis. In the second chapter, the situations of the MBVC were analyzed based on our conceptual framework forwarded to support the narratives of the chapter. The case study approach was used for this analysis in order to assist us to formulate the key propositions for further investigation in subsequent chapters. Afterwards, the third chapter dealt with thorough investigation of the integrative role of information sharing between MBVC members. The fourth chapter treated transaction governance and attributes at various interfaces of the MBVC by way of relating them to the level of strength of the chain's integration. In chapter five, the influences of VCI constructs on VCP at the various interfaces were assessed. Finally, the sixth chapter recapitulated the main findings of chapters two through five to provide the concluding remarks, described the main limitations of the studies presented in these chapters, and indicated the directions that future research should take.

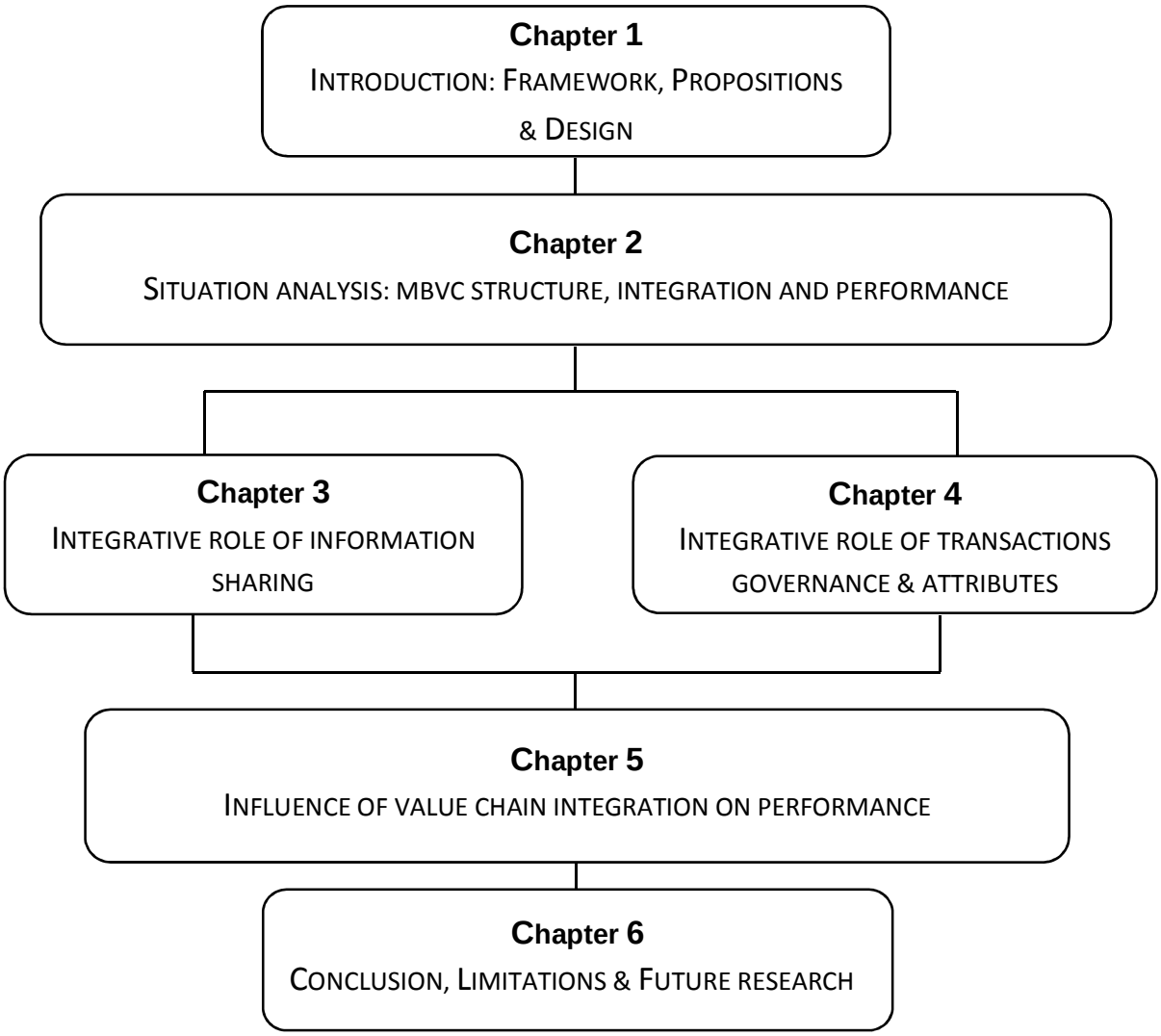


Figure 4: Structure of the dissertation
Source: own compilation

1.6. Description of the MBVC in Ethiopia

In Ethiopia, beer consumption has been growing sharply at an estimated rate of 24 percent per annum, roughly at rate that doubles the average annual growth rate of the real GDP of the country. Even then, the per capita beer consumption in Ethiopia is the lowest which is only 4 liters compared to 12 liters in Kenya, 25 liters in Cameroon, 37 liters in Angola, 40 liters in Botswana, 53 liters in Nigeria, and 59 liters in South Africa (Report-Access, 2010). This is mainly due to limited volume of beer production and high prices of beer as compared to other traditional alcoholic drinks widely consumed in towns and rural villages throughout the country

though the trend is shifting towards beer and other bottled or canned or bottled alcoholic drinks.

Future forecasts show dramatic increases in demand for beer in Ethiopia. According to the same report, 3.6 million hectoliters of beer was consumed in the same year and the volume has been increasing year by year at an annual rate of around 20 percent to cope with the increasing demand for beer through optimization of existing and creation of new capacities. The commonly cited causes for the increases in beer consumption are population growth, expanding urbanization, continued economic growth, and gradual convergence of national consumption level towards that of neighboring country, (Steen and Maijers, 2014). The rapid increase in beer demand implies increasing trends of demands for malt and malt barley.

According to the report of Department of Agriculture (2014) of the US government, Ethiopia is the largest producer of barley in the African continent with the total production volume of 2.1 million metric tons followed by Morocco and Algeria which produced 1.7 and 1.3 million metric tons respectively in the same year. The report of the Ethiopian Central Statistic Authority (CSA, 2014) indicates that 80 percent of barley produced in country are food/feed varieties and only the remaining 20 percent are suitable for malting. Based on this statistics, Ethiopia produced about 420 thousand metric tons of malt barley during the same cropping season which is far greater than the malt factory's maximum requirements of 48 thousand metric tons of malt barley. This being the fact, presently malt supply from local source meets not more than 40 percent of the total requirements of local breweries.

The report of Ethiopian Customs and Revenue Authority of 2010/11 indicates that local breweries have imported an aggregate around 33 thousand tons of malt that worth 20.7 million USD primarily from Europe to meet the demand gap created due to weak integration in the chain. From this, one can easily apprehend that substantial amount of hard currency is spent on malt importation though it can be substitutable. The country would even be forced to spend more hard currency for malt import in the years to come unless meaningful improvement is made to create strong MBVC integration. In addition to the preponderant import expenditure,

the longer lead time would also suppress VCP. From sustainability point of view, strengthening MBVC integration deems to be the right strategy to follow.

In Ethiopia, malt barely is mostly grown by small-scale farmers in the highlands of Arsi and Bale administrative zones of the Oromia regional state (Legesse et al., 2007). In addition to the highlands of Arsi and Bale zones, Muhe (2011) indicated that there is also a huge potential to grow the crop in other parts of the country. Malt barley is also produced by a state-farm in Bale zone. During the time of our visit to the state farm, we came to know that the state farm totally shifted to wheat production due to the comparative productivity advantage wheat provides over malt barley. Moreover, the state farm has indicated that its linkage with the malt factory is very weak and that is a major trigger for the shift. The average productivity of malt barley in the study area is 1.9 tons per hectare which is lower than the productivity rates for food barley and wheat of 2.7 and 2.5 tons per hectare respectively. The average prices of malt barely, wheat and food barley per ton are 6,364.30 ETB, 5,920.00 ETB, and 5,155.80 ETB respectively. However, the relatively highest average price paid for malt barley does not compensate its low yield and the extra efforts malt barley production requires to meet even the minimum quality standards set by the malt factory compared to wheat and food barley in the view of most interviewed farmers.

Though Ethiopia has a very suitable agro-ecology for malt barley production, farmers could not produce as much volume and high quality of malt barley as required due to limited access to improved agricultural inputs and technologies limited technical supports or lack of fair markets. The weak MBVC integration reduced the quantity and lowered the quality of malt barley which in turn lowered the quantity and quality of malt produced as a result of which local breweries were forced to depend on imported malt whose sustainability is beyond their control.

The farmers in the study area produce malt barley mainly to support their own home consumptions and to obtain income that they need to meet other household monetary expenditures. These farmers are less aware about the role malt barley quality plays in determining the quality of successive products (i.e. malt and beer) along the value chain. Moreover, the use of traditional farming practices by farmers constrains both quantity and

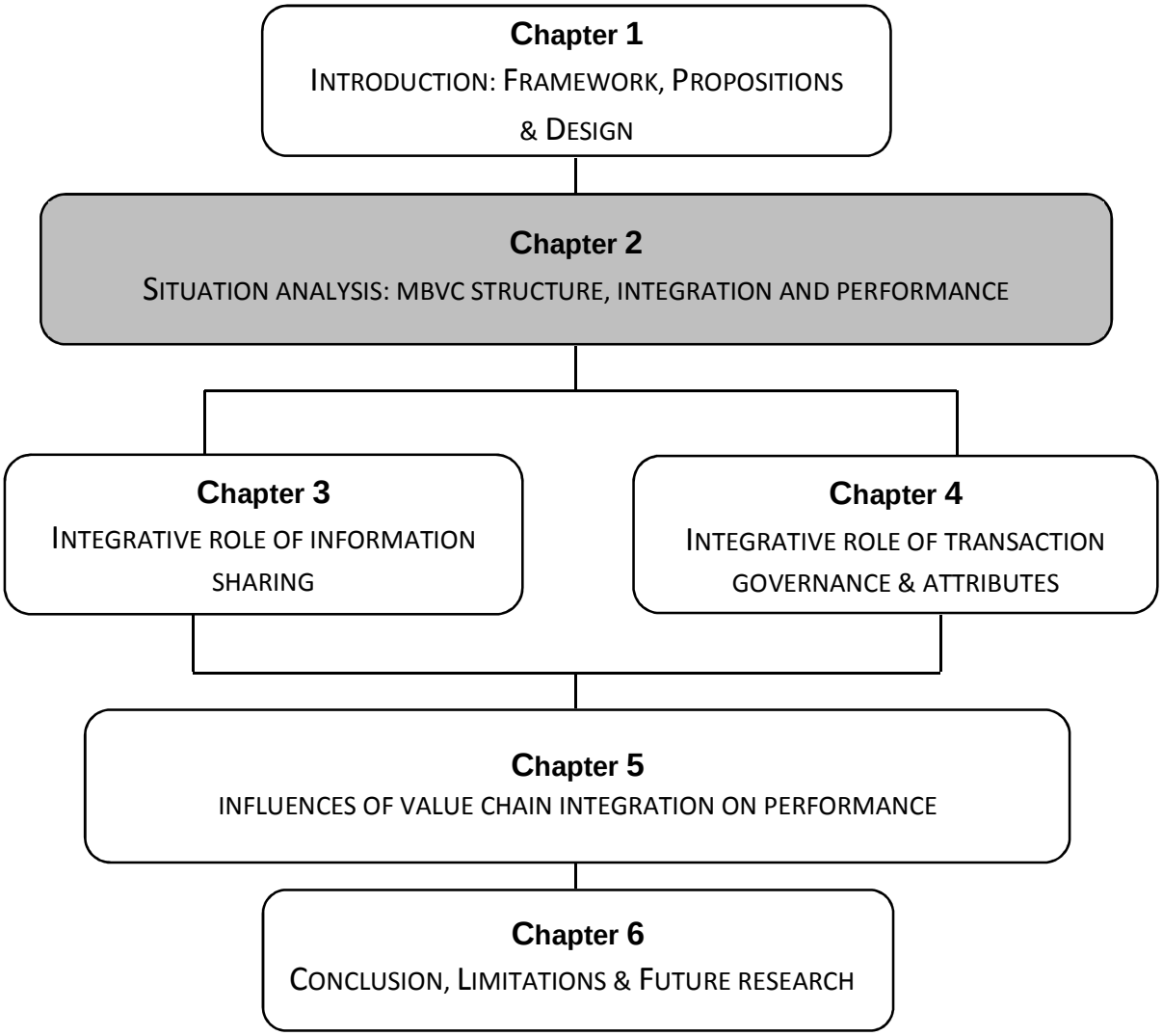
quality of malt barley. The farmers do not use improved agricultural inputs due to credits inaccessibility, high vendors' prices, disorganized and ineffective cooperatives. The shortage in supply of certified improved seeds as a result of poor collaboration among MBVC members on seed development and other value chain improvement interventions is the most critical limiting factor of quality of malt barley.

Currently, farmers in Arsi and west Arsi zones produce malt barley and supply it to AMF mainly through traders and/or their cooperatives and/or directly in groups or individually. The largest volume of malt barley is supplied to the malt factory through traders' channels. A small proportion of farm sales are made directly to the factory by individual farmers or in groups. Though farmers can sell malt barley directly to the factory, the direct channel is rarely used due to some delay by the factory at time of harvest to announce prices which is a peak time for farmers to sell malt barley. Moreover, the procurement standards of AMF include a minimum of 5 tons per a transaction. This forces most small-scale farmers to aggregate malt barley for direct sale, or sell to traders. Furthermore, heterogeneity of malt barley quality makes malt barley aggregation by farmers difficult. Finally, AMF requires stringent quality verification to complete transactions and such verification often exposes sellers to higher transaction costs. It is difficult for farmers and small-traders to obey such tight quality verification.

The AMF, a public enterprise, is a major buyer of malt barley in the study area. It has the maximum annual capacity of producing 36 thousand tons of malt and requires the maximum of 48 thousand tons of malt barley for malting. The fact that the factory is a public ownership has limited its flexibility while dealing with value chain partners. In the MBVC, the malt factory sets prices for all malt barley varieties and quality-grades. Despite its apparent monopsony position, the malt factory claims that its prices are fair since are based on market assessments. In the contrary, upstream value chain members complain for being exploited by the malt factory. The farmers are also distressed that traders and cooperatives exercise more negotiation power on exchange transaction and generate much higher profit margins at the expense of farmers. The large agro-processors (i.e. the malt factory and breweries) provide less support to the upstream members on the supply of agriculture inputs, production and delivery of malt barley though some MBVC improvement initiatives were started after the entrance of multinational breweries.

Since MBVC is at its immature stage, its members have not yet started to recognize VCI as a strategic means to revive their own individual and overall chain's performances. The lack of "value chain thinking" is the key factor that constrains MBVC integration. It can further be proposed that weak MBVC integration lowers MBVC performance.

Though the country produces large quantity of malt barley and has a huge potential to produce even more, the MBVC is poorly organized and weakly integrated to aggregate the harvested malt barley and to utilize the untapped potential to produce even more quantity of malt barley. *This doctoral dissertation, therefore, hypothesizes: the weaker the MBVC integration due to influences from constructs of the value chain's structure, the lower the value chain's performance*. This doctoral dissertation is based on the compilation of the studies investigating this umbrella hypothesis.


Chapter 1
INTRODUCTION: FRAMEWORK, PROPOSITIONS & DESIGN
Chapter 2
SITUATION ANALYSIS: MBVC STRUCTURE, INTEGRATION AND PERFORMANCE
Chapter 3
INTEGRATIVE ROLE OF INFORMATION SHARING
Chapter 4
INTEGRATIVE ROLE OF TRANSACTION GOVERNANCE & ATTRIBUTES
Chapter 5
INFLUENCES OF VALUE CHAIN INTEGRATION ON PERFORMANCE
Chapter 6
CONCLUSION, LIMITATIONS & FUTURE RESEARCH

Chapter 2

Value Chain Integration as a Fit between Structure and Performance: Situations analysis

The chapter is based on:

Watabaji, M. D., Molnár, A. and Gellynck, X. (2016). Situations analysis of the malt barley value chain integration and performance in Ethiopia. *Outlook on Agriculture* **45**(3): 158-64

Watabaji, M. D., Molnár, A. and Gellynck, X. (2016, 08-09 December). Situation analysis of the malt barley value chain integration and performance in Ethiopia. The 10th symposium of Ghent Africa Platform (GAPSYM10), Ghent, Belgium.

Molnár, A., Watabaji, M.D. and Gellynck, X. (2015, 09-13 February). Value chain structure, integration and performance: A situational analysis of the malt barley value chain in Ethiopia. 9th International European Forum on System Dynamics and Innovation in Food Networks, Innsbruck, Austria.

Watabaji, M.D., Molnár, A., Gellynck, X. (2015, 2-3 December). Value Chain integration as a fit between structure and performance: A situation analysis of the Malt Barley Value chain in Ethiopia. Value Chain Management Seminar, Adama, Ethiopia.

2. Value chain integration as a fit between structure and performance: A situation analysis

2.1. Introduction and objectives

As indicated in the introductory chapter, value chain structure (VCS) refers to geographic dispersion of value chain members; their horizontal and vertical arrangements (Lambert and Cooper, 2000), information flows (Wu et al., 2004; Mungandi et al., 2012) and transactions governance in value chains (Stock et al., 2000). The geographic dispersion of value chain members alludes to the distribution of members over a given geographic area. Transaction governance refers to the control exercised by value chain members over other members during exchange transactions which ranges from a spot-market (with less control) to a hierarchy (with more control) and, hybrid governance with moderate control levels between the two extreme ends (Peterson et al., 2001; Gellynck and Molnár, 2009). Although these constructs of VCS are believed to influence value chain integration (VCI), it was not sufficiently studied yet (Slone et al., 2007; Gagalyuk and Hanf, 2011).

Nowadays, VCI has become prominent research agenda (Wu et al., 2004) due to its importance in the conceptualization of the whole discipline of value chain management (Romano, 2003). It refers to the spirit of collaboration among members (Mentzen et al., 2001; Fawcett and Mignan, 2002; Min et al., 2005; Arshinder and Deshmukh, 2008; Li et al., 2009; Villena et al., 2009; Cao and Zhang, 2010; Flynn et al., 2010) and coordination of activities and decisions (Malone and Crowston, 1990; Dolan and Humphrey, 2000; Mentzen et al., 2001; Fawcett and Mignan, 2002; Romano, 2003; Donk et al., 2008; Li et al., 2009; Villena et al., 2009; Cao and Zhang, 2010; Flynn et al., 2010) towards accomplishment of overall value chain goals. The first step towards VCI, from a point of view of the focal company, is to work with immediate suppliers and customers closely. Once immediate suppliers and customers are integrated with the focal member, it would be easier for this member to work with its suppliers' suppliers and customers' customers (Lambert and Cooper, 2000).

Value chain members have already recognized the importance of VCI in improving VCP and put consistent efforts towards its realization (Davis, 1993; Stock et al., 2000). However, failure to

make such consistent efforts affects not only the performance of individual members, but also that of other members (Lambert and Cooper, 2000; Stock et al., 2000; Vanpoucke, 2009) and can hardly be possible to achieve competitive advantage (Dolan and Humphrey, 2000). Consequently, the influence of VCI on VCP was proposed and previous empirical research suggested that VCI constructs are vital cornerstones to achieve higher VCP (Simatupang and Sridharan, 2001; Yu et al., 2001; O'Leary-Kelly and Flores, 2002; Danese et al., 2004; Pagell, 2004; Gimenez and Ventura, 2005; Sheu et al., 2006; Tummala et al., 2006; Wu et al., 2006; Slone et al., 2007; Arshinder and Deshmukh, 2008; Vaart and Donk, 2008; Haozhe ChenDaugherty, 2009; Kim, 2009; Rajaguru and Matanda, 2009; Richey Jr et al., 2009; Villena et al., 2009; Wever et al., 2009; Prajogo and Olhager, 2012). Awad and Nassar (2010) and Yu et al. (2001) agree with the link between VCI and VCP, however assumes a reverse relationship, which means, high VCP leads to high VCI, while Ho et al. (2002) doubt the existence of positive impact of VCI on VCP. As such, there is no sufficient empirical studies to address relationships between key constructs of VCI and VCP and that offers a scope for this study.

Based on literature gaps and the needs to show better ways for MBVC integration and performance, the specific objectives of the chapter are to (1) explore the MBVC situation within the conceptual framework of VCS-VCI-VCP paradigm, (2) assess the relationship between VCS constructs and VCI and the between VCI constructs and VCP, and (3) sharpen the key propositions highlighted in the introductory chapter for further investigation in the subsequent chapters. By doing so, the study reported in this chapter makes important empirical contributions to the entire value chain management literature. Moreover, the key findings reported in this chapter help policy-making towards the facilitation of the commercialization processes of the Ethiopian agriculture which is also the main objective of the NICHE-ETH-019 project in the framework of which this doctoral dissertation was designed.

The chapter is organized as follows: The next section provides a framework that integrates key constructs of VCS, VCI and VCP followed by the third section that elaborates the research methodology. In section 4, important qualitative results are discussed and key propositions are constructed. Section 5 provides the conclusions and hints the practical implications.

2.2. Theoretical background and conceptual framework

In the past, the term “structure” was commonly used in organizational management literature to show the division of tasks, authorities and responsibilities or to express the unity of order or command within a single company (Stock et al., 2000; Pagell, 2004). The use of the word in the context of VCS is a recent phenomenon and refers to the geographic dispersion of members’ location, their horizontal and vertical arrangements within and along value chain tiers, the information flows, and the transaction governance (Stock et al., 2000).

Whereas, VCI is the new approach to overcome individual member’s performance failure in the overall value chain context (Bitzer, 2012). In this dissertation, VCI is defined based on concepts of collaboration among value chain members, coordination of activities along the value chain interfaces, commitment of value chain members towards long-term relationships, and their readiness to make joint decisions on important operational and strategic issues (Kwon and Suh, 2004; Wu et al., 2004; Min et al., 2005).

As indicated in the introductory chapter, value chain performance (VCP) is one of the key constructs in general conceptual framework of this dissertation. We employed suitable indicators to measure VCP in the context of the MBVC from past studies (Cooper et al., 1997; Ramdas and Spekman, 2000; Stock et al., 2000; Kim, 2009; Coa and Zhang, 2010). These are: quality, responsiveness, flexibility and efficiency (Aramyan et al., 2007; Zhou and Benton Jr, 2007; Molnár, 2010; Fattahi et al., 2013). According to past studies, quality refers to the purity of the product; flexibility indicates value chain members’ capabilities to respond to changes; responsiveness measures value chain members’ ability to deliver products to satisfy needs of customers within the shortest possible lead-time; and efficiency deals with the maximization of profit by keeping the costs of inputs as low as possible without compromising quality.

In their study of enterprise logistics and chain structure, Stock et al. (2000) formulated a conceptual framework that fits VCS to VCI. Pagell (2004) used similar conceptual framework to study factors that influence VCI based on concepts of structure, integration and performance but among functional units within the context of a single firm, but not from the perspective of

the entire value chain. In her study on VCP and value chain relationships in the European traditional food sector, Molnár (2010) formulated a similar conceptual framework, but there was an overlap of concepts of VCS and VCI in her framework. Similarly, Ghosh and Fedorowicz (2008) and Dentoni et al. (2012) formulated a conceptual framework that links governance, integration and VCP concepts which partially replicates the sequential relationship between VCS constructs and VCI and between VCI constructs and VCP. Based on these studies and intensive reviews of related literature, a conceptual framework for this study was formulated, see Figure 5.

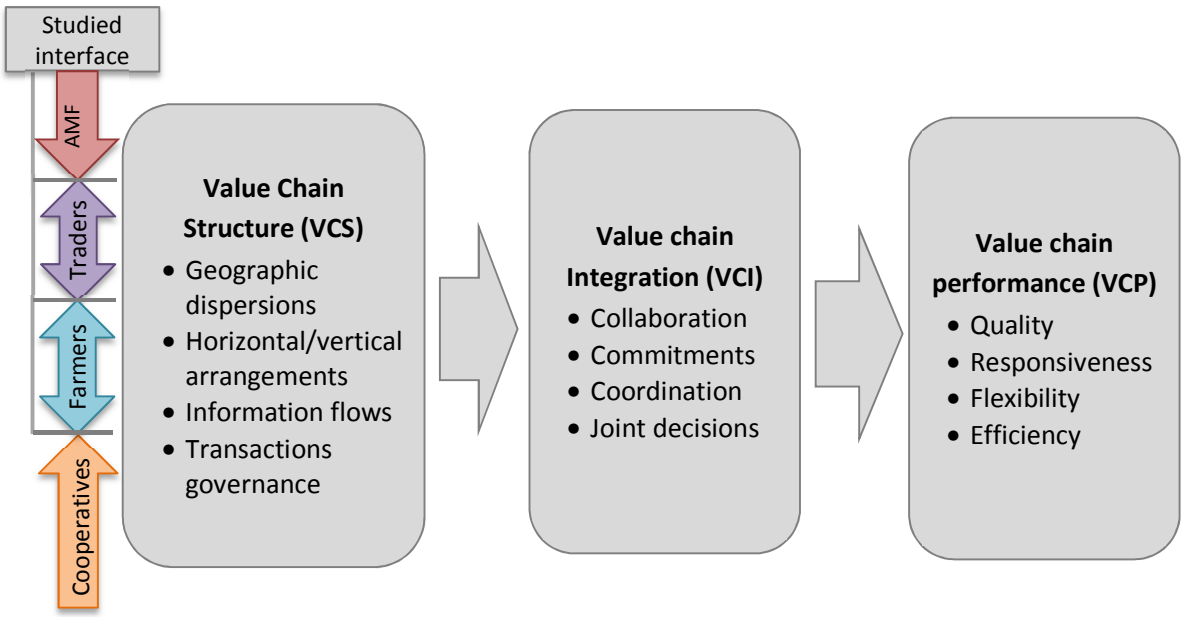


Figure 5: Conceptual framework linking VCS, VCI and VCP

Source: Own formulation based on past studies (Stock et al., 2000; Pagell, 2004; Ghosh and Fedorowicz, 2008; Molnár, 2010; Prajogo and Olhager, 2012)

2.3. Research methodology

As suggested by Baxter and Jack (2008) and Yin (2009), we employed a holistic qualitative case study approach as it best fits our purpose. A maximum care was taken not to deny the attentions some value chain members deserve while providing more attention to other members, which is a common mistake in most case studies.

2.3.1. Sampling and data collection

As it was indicated under the research design in the introductory chapter, a multistage sampling technique was employed to select districts and key informants from among members of the MBVC in Ethiopia (Herrmann and Brüntrup, 2010; Bastl et al., 2012). Data used for this study were gathered mainly through qualitative interviews. Interview guides were prepared in advance to enhance data consistency and reliability. In total, 76 qualitative interviews were conducted of which 27 were with farmers; 13 were with traders; 17 were with cooperatives' staff, 5 were with managers of AMF, 11 were with managers of breweries, 2 were with managers of ESE and 1 was with coordinator of MBVC improvement project funded by the Self Help Africa, a non-governmental organization. The use of qualitative interviews as a method of data collection helped us to obtain more inclusive and conclusive information (Bastl et al., 2012). During the qualitative interviews, respondents were asked to explain how much they know about the MBVC structure and the level of its integration and performance. More specifically, they were asked to identify key members of the MBVC, to explain the roles of these members, their arrangement within and along the value chain tiers, the level of information sharing (both in terms of volume and quality) between value chain members, the effectiveness of transaction governance, the strength of MBVC integration, the method of VCP measurement and the level of satisfaction with current level of VCP and so forth.

Moreover, survey data obtained from 320 farmers and 100 traders were used to complement the qualitative interviews (Kambewa, 2007). Detail explanation of the sampling techniques used to draw samples of farmers and traders were provided under the research design in the introductory chapter. The use of data obtained from multiple sources improves the quality and reliability of the findings (Kambewa, 2007; Van Donk et al., 2008; Vieira and Traill, 2008; Yin, 2009).

2.3.2. Data Analysis

For the case study presented in this chapter, a deductive research approach whereby existing theories on value chain structure, integration and performance were used to explore the same issues in the MBVC to come up with key researchable propositions. Even though solicited from

MBVC members, interview responses were put into chain context during the analysis (Vieira and Traill, 2008). Thus, all responses were analyzed within the context of the MBVC to obtain clear picture about the structure, integration and performance of the chain. The interview responses were initially transcribed, sorted, organized and finally analyzed based on definitions of concepts and perspectives outlined in the conceptual framework (Miles and Gargeya, 1994; Van Donk et al., 2008; Vieira and Traill, 2008), hence a template analysis was employed (Bastl et al., 2012). Eventually, a complete set of logical links were established between VCS constructs and VCI and between VCI constructs and VCP and important researchable propositions were derived from those logical links as envisaged in the conceptual framework (Ellram, 1996). Similar to the work of Mikkola (2008), special attentions were given to contradicting views of MBVC members while drawing key findings.

2.3.3. Case descriptions

As indicated in the introductory chapter, the MBVC encompasses millions of small-scale farmers, hundreds of traders and cooperatives, a single malt factory and four breweries as its key members. Though it is difficult to precisely describe small-scale farmers at the upstream tier of the chain, we adopted the definition provided by Brüntrup (1997). According to this scholar, these farmers are traditional peasants, resource poor, and users of less inputs and technologies. In the MBVC, traders (small, commission agents and big buyers) widely participate in the collection of malt barley from farmers, transfer to one-another and finally deliver it to the malt factory and other buyers (consumers, flour factories, and even farmers for seeds). Though there are several multipurpose farmers' cooperatives in the study area, the level of their participation in the malt barley collection is very minimal due to bad connotation given to cooperatives during the previous socialist regime in the country. The AMF is a single malt factory to use malt barley for malting and selling malt to the local breweries. The Saint George (BGI), the Harar and Bedele (Heineken) and the Meta (Diageo) are the four major brewing plants that participate in the MBVC in Ethiopia.

2.3.4. MBVC Mapping

Before proceeding with the detailed investigation of the structure, integration and performance of MBVC, we would like to map its key members to show the different flows (material, information, financial, and technology) as depicted in Figure 6. For this study, data (both interview and survey) were collected from members in boxes shaded with parallel diagonal lines while members in boxes shaded with dots were neither interviewed nor surveyed, see Figure 6.

***NGOs** = None governmental organizations working on MBVC improvements

Source: Own construction from own empirical data

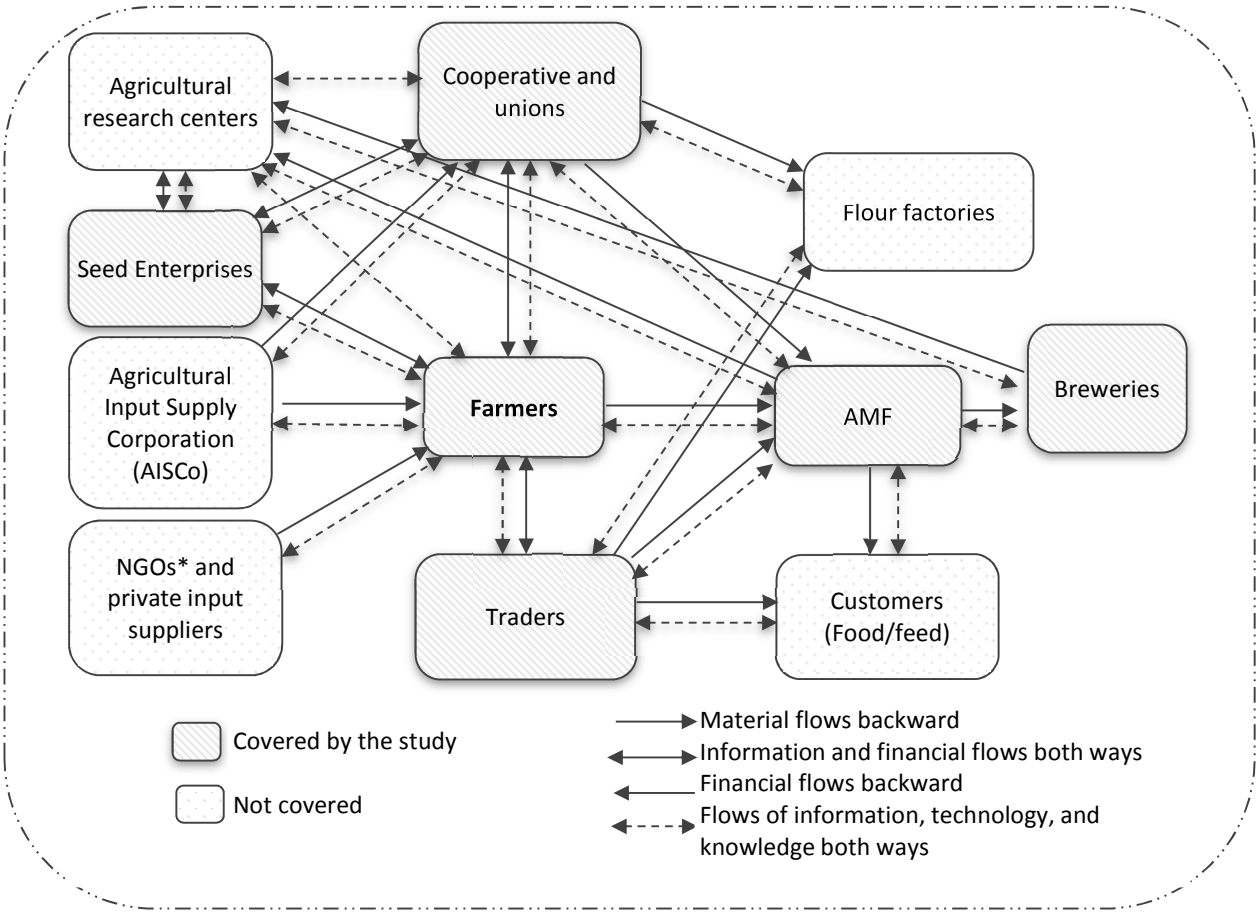


Figure 6: The map of the Malt barley value chain in Ethiopia

2.3.5. Malt barley and malt productions

The amount of malt barley produced by farmers and procured by the malt factory, the size of land used for malt barley farming, and the amount of malt produced by the malt factory

fluctuate from year to year though the magnitudes of the change are not so significant during the period of 2007-2013, see Table 1. Production figures in the four studied districts are by far greater than the purchase figures reported by AMF during the same period. This shows the production of surplus malt barley in the study area which is more than sufficient to meet the requirements of AMF had it been properly collected. However, large part of malt barley is consumed as foods and feeds by the farmers and good amount of it goes to other competing channels (e.g. urban consumers or flour factories). As such, AMF's demand has never been met due to weak integration with traders who are in fact the major suppliers. It was observed that the volumes of malt barley procured and malt produced by AMF change along with the size of land used and the volume of production.

Table 1: Land-size, malt barley and malt production and procurement

Year	Study Districts		Assela Malt Factory (AMF)	
	Land-size for malt barley farming (hectares)	Malt barley production (tons)	Malt barley purchase (tons)	Malt production (tons)
2009	20,390	59,131	21,704.69	16,819.60
2010	17,439	45,341	23,718.70	11,526.30
2011	19,602	54,886	34,861.51	22,595.05
2012	19,316	48,290	20,244.29	25,727.73
2013	24,374	65,810	27,820.70	20,724.30

Source: Districts' Offices of Agriculture and AMF

2.3.6. Malt barley and malt flows

From this study, we understood that farmers acquire inputs such as improved seeds, herbicides, pesticides, and technical supports mainly from cooperatives and partly from seed enterprises, district agricultural offices, and private vendors. On the other hand, farmers sell malt barley to various customer-groups such as traders (i.e. big buyers, small traders, and nucleus farmers who undertake petty malt barley trading alongside farming), the seed enterprises, AMF, consumers, cooperatives, and even to other farmers for seeds. Currently, majority of farmers (i.e. 79 percent) sell large amount of their malt barley to traders, see Figure 7 item a.

Regardless of extensive efforts made by AMF to get direct supply of malt barley from farmers or through cooperatives to reduce hands-on by shortening the chain, the success rate is very low. The main reasons for this are rigid structure of cooperatives that limits their capacity to

compete with traders. Traders can easily persuade the farmers by offering insubstantial incremental prices to which cooperatives cannot promptly respond due to their structural rigidity. Once the cooperatives are drifted out of the market, traders remove the incremental price and also manipulate measurement scales to give themselves higher profit margins at the expense of farmers. In actual terms, most farmers sell malt barley through traders though the channel does not provide them fair share of benefits compared to their efforts.

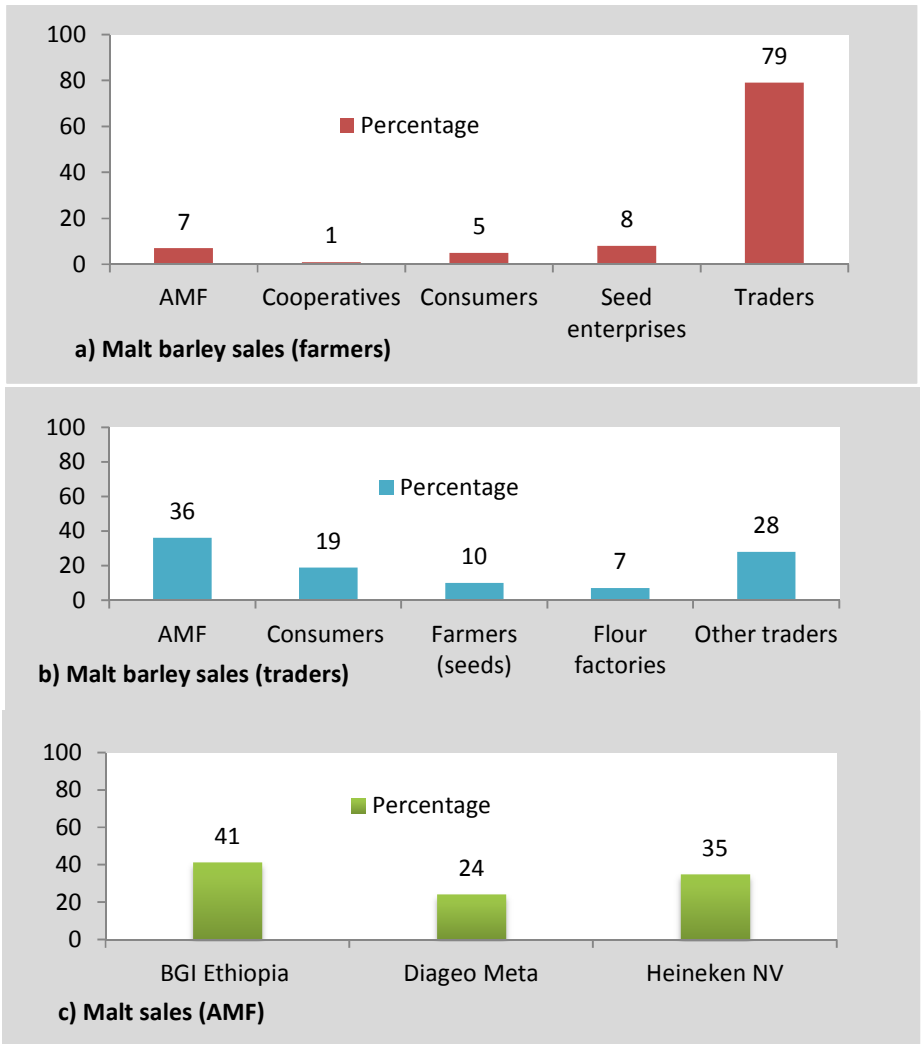


Figure 7: Malt barley and malt sellers and buyers
Source: Farmers' and traders' survey and AMF report of 2013

In the MBVC, big traders buy malt barley mainly from small-scale farmers and partly from small traders and nucleus farmers. Big traders, in turn, sell malt barley to various customer-groups though AMF is the biggest of all, see Figure 7 item b. Furthermore, traders sell significant amount of malt barley to consumers while many alternative crops are available for consumption. Some traders sell better quality malt barley to cash-strap farmers for its use as seeds on credit against the privilege of having the first purchase opportunity of malt barley from the beneficiary farmers up on harvest as a means of repayment.

The AMF, as a sole malt plant in the study area, supplies the largest share of its malt to BGI Ethiopia which buys 41 percent of the total 33.6 thousand tons of malt the factory produced during 2013 budget year followed by the Heineken N.V. which bought 35 percent of the total malt produced in the same year for its two subsidiaries (Bedele brewery which used 19 percent whereas Harar brewery which used 16 percent). Diageo Meta brewery, on the other hand, received the supply of the remain 24 percent of malt in the same period, see Figure 7 item c.

2.3.7. Core activities and backgrounds of MBVC members

Based on information obtained through interviews, field survey, and personal observations, Table 2 presents the core activities and brief background information of the key members of the MBVC in Ethiopia.

Table 2**: MBVC members' core activities and background information**

Members	**Core activities**	**Background information**
Farmers	Plough, saw, weed, harvest, thresh, dry, store, pack, transport, and sell	Predominantly small-scale engaged in mixed farming. Produce mainly malt barley along with other cereal crops. Average landholding of 1.85 hectares and average malt barley productivity of around 2 tons per hectare. Most of them are members of cooperatives (80% membership).
Cooperatives and unions	Collect, weigh, pay, sort, assure quality, pack, transport, and sell	Poor organization and structure and low performance. The stronger ones are profit oriented than protecting member-farmers' interests. All are members of cooperative unions to fulfill legal requirements. Only two cooperative unions currently supply malt barley to AMF.
Traders	Collect, weigh, pay, sort, assure quality, pack,	Few farmers that undertake petty malt barley trading alongside farming.

	transport, and sell		Small merchants that buy malt barley up to ten tons at a time and supply to AMF, big traders, flour factories and other consumers. Agents who buy malt barley for big traders for a commission Big traders supply around 90% of total local malt barley requirement of AMF (individual capacity of over 100 tons at a time).
AMF	Pay, store inputs, process, assure quality, store output, and distribute		Established in 1984 and located at the outskirt of Assela town, 158 km southeast of Addis Ababa. Has an annual production capacity of 36,000 tons. The only malt plant in the study area and the bigger in the country.
Breweries	Saint-George	Assure quality, pay, store inputs, process, pack in bottles or cans, transport, and distribute	Established in 1922 in the capital and the first brewing plant in the country, 176 Km far from AMF and privatized to BGI in 1998. BGI runs two other branches -at Kombolcha, 365 Km north and at Hawassa, 275 Km south of Addis Ababa. Kombolcha branch is the farthest with distance of 521 km from AMF. Market share of 48% and annual aggregated production capacity of 2 million hectoliters. Covers 45% of its malt requirements from local source.
	Meta-Diageo		Established in 1963 at Sebeta, 27 Km southwest of Addis Ababa and 175 km away from AMF. Market share of 16% and annual production capacity of 0.6 million hectoliters. Full subsidiary of Diageo Plc, the world's biggest distiller of Guinness and Johnny Walker whiskey brand. Covers 40% of its malt requirements from local source.
	Harar		Established in 1983 in the city of Harar, 526 km east of Addis Ababa, and 500 km away from AMF. Has a market share of 10.5%[a] and annual production capacity of 0.45 million hectoliters. Privatized and a full subsidiary of Heineken N. V since privatized in 2011. Covers 40% of its malt requirements from local source.
	Bedele		Established in 1993 in Bedele town, 483 km southwest of Addis Ababa and 600 km away from AMF Market share of 7.5% and annual production capacity of 0.3 million hectoliters. Full subsidiary of Heineken N.V. since privatized in 2011. Covers 45% of its malt requirements from local source.

[a]Large expansion by Heineken N.V. during survey period not implicated in its market share

Source: Data collected from members

2.4. Qualitative results and discussions

2.4.1. The MBVC structure

On top of the recent rapid growth of the local beer market, the entrances of world-class multinational breweries like Society for Brassiere and Glaciers International (BGI), Heineken N.V., and Diageo Plc to the Ethiopian beer sector created a meteoric opportunity for the chain to develop. However, there are several challenges related to the structure of the chain that the new entrants should tackle in collaboration with other chain members. These multinationals already started some ground work to improve local sourcing to meet their high targets in this regard. For instance, Heineken N.V. aspires to meet 60 percent of its malt requirement from local source by 2020 and started to make some interventions at the grassroots level to realize this target. Other breweries also set similar targets in relation to local sourcing. The head of the Agribusiness Department at Meta-Diageo brewery elaborates his company's position on local sourcing by saying the following:

> "reliance on local malt makes our business easier, profitable and sustainable. Ethiopia is a non-oil exporting country and its trade balance is always a net import and foreign currencies are often scarce. If malt demand is met from local source, the scarce foreign currencies can be used for the import of other non-substitutable products. Sustainable local sourcing of malt would disengage us from cumbersome processes of importation. Moreover, our company believes in all-inclusive growth whereby every member of the value chain gets fair share of the generated benefits and encountered risks. At our company, the economic, social, and political importance of local sourcing is well-understood. Local sourcing is a gateway to link small-scale farmers to the large and sustainable market offered by large agro-processing companies which provides better income and reduce rural poverty."

In the MBVC, millions of small-scale farmers produce less quantity and poor quality malt barley due to small land size, lack of proper inputs, use of traditional farming practices, and lack of specialization. Though cooperatives are known for the role of effective linkage of framers to big agro-processing companies (Bijman et al., 2010), those in study area are poorly organized and weak. They could not support the farmers on materials/information flows and technology dissemination (Vandeplas et al., 2013). Moreover, they could not establish uniformity in the

malt barley quality through coordination of the activities of dispersedly located farmers. Similarly, Stock et al. (2000) expressed that geographic dispersion of members' location causes weak VCI. According to our own field survey, farmers need to travel for 5:25 hours on average by car to reach AMF due to long distance and poor transport facilities. Moreover, a farmer should be able to supply a minimum of 5 tons of malt barley per transaction if she or he opts for direct sales to the malt factory. Many farmers do not have the capacity to meet the minimum required supply per transaction and it is also difficult for them to supply in groups due to quality variations. Farmers have literally no option than to sell to traders at very low prices. In a similar vein, breweries are dispersedly located though one can still argue whether disperse location of members weakens VCI. Hence, we propose the following proposition for further investigation.

Proposition 1a: *The more disperse the geographic locations of value chain members, the weaker the VCI.*

In this study, like in the study by Stock et al. (2000), horizontal VCS refers to the number of triers that form the MBVC. It is what determines the length of the chain. Though farmers repeatedly implored the malt factory to establish collection centers in nearby towns to support direct sales, the economic feasibility has been doubtful to the factory. As indicated earlier, cooperatives are expected to play key roles in bridging farmers and AMF. Cooperatives' failure to do so gave a space in the chain to opportunistic traders who reap higher benefits while adding no or little value. In the view of AMF's managers, it is not rational to establish collection centers given the large number of dispersedly located small-scale farmers. AMF has no plan to establish such centers but would encourage farmers to directly supply at the factory's gate to the factory or through cooperatives than through traders. Based on these, we propose the following.

Proposition 1b: *The longer the horizontal structure of the value chain, the weaker the VCI.*

In the view of Stock et al. (2000), vertical VCS refers to the number of members within each tier of the value chain. A chain might have a narrow vertical VCS with few members or a wide vertical VCS with many members in the same tier. The authors indicate that value chains with wide vertical VCS cannot easily be integrated end-to-end. Members of such value chains usually

limit their scope of integration only to their immediate suppliers and customers and leave the tasks of integration with distant members to their immediate suppliers and customers. The engagement of million farmers in malt barley production and hundreds of traders and cooperatives in collection form too wide vertical VCS at the MBVC upstream tiers. On the other hand, the fact that a single malt factory operates in the mid-stream of the chain forms too narrow vertical structure.

A manager of the Supply Chain Department of Heineken N. V. and a coordinator of the Malt Barley Improvement Project of Self Help Africa expressed the dire needs for improved seeds and better market for malt barley which cannot be met through isolated efforts of value chain members, rather it can be met through strong integration of the entire chain. With that conviction, Heineken NN already started with some preliminary initiatives that would improve MBVC integration. The supply chain manager of the company explains the initiatives and the rationale as follows:

> "In order to achieve the target of local sourcing of 60 percent for its plants in Ethiopia, Heineken N.V. has a strong motive and plan to collaborate with other members and stakeholders on projects that improve integration and overall performance of the chain. Given the suitable agro-ecology of the areas, the target can easily be achieved if farmers are provided with the required inputs, organized into strong groups/cooperatives and linked to the malt factory and then to breweries. Though farmers are small-scale, they can still respond to market stimuli. If good prices are paid, farmers can always put extra efforts to produce sufficient volume and good quality of malt barley. That can only be possible when they are linked to AMF either individually or through vibrant cooperatives or through model farmers."

The project called Community Revenue Enhancement through Agricultural Technology Extension (CREATE) funded by the Dutch Ministry of Foreign Affairs and the European Cooperative for Rural Development (EUCORD) is one of Heineken's initiatives to improve malt barley production, productivity and distribution in collaboration with other stakeholders such as Ethiopian Institute of Agricultural Research (EIAR) and Agricultural Transformation Agency (ATA). To this end, Heineken facilitated field trials of eight high yielding malt barley varieties brought from Europe at multiple sites in Ethiopia. Of all varieties, *Traveler and Grace* have

performed well and got approval from the National Variety Releasing Committee (NVRC) for multiplication and distribution to farmers for wider scale production.

However, the engagement of too many but small-scale farmers in malt barley production has formed a wide tier at that interface, which makes transactions execution somehow difficult especially given the weak cooperatives and the opportunistic traders operating in the chain. Past studies have also reflected the same view that transactions execution is difficult when chain tiers are wide (Lambert and Cooper, 2000; Wever et al., 2009). Hence, we propose the following.

Proposition 1c: *The wider the vertical structure of the value chain, the weaker the VCI.*

The flow of information between members can determine the level of VCI (Mungandi et al., 2012). The flow is said to be effective and efficient when information with the sufficient volume and good quality is shared between value chain members at the lowest possible costs (Mohr and Sohi, 1996; Raynolds et al., 2009). But MBVC members, mostly famers, are not yet aware of the value of information sharing. When farmers were asked about other members participating in the chain, most of them do not know which members participate in distant tiers. One farmer, for instance, replied:

> "I do not have complete information about all members that participate in the MBVC from end-to-end. I only know traders to whom I sell the malt barley. I learnt from them that the malt barley eventually becomes malt after passing through several processing steps at AMF. I do not know what the malt is used for afterwards."

Currently, farmers obtain sufficient volume and good quality of information from development agents (DAs) who are junior agriculturalists than from other value chain members. The malt factory frequently organizes training programs for model farmers on latest and best agricultural practices and technologies, and market linkages with the intention that these farmers would share the knowledge gained to other farmers as well. But knowledge sharing among farmers is a rare practice.

In the view of interviewed managers of ESE and AMF, interactions between the enterprise and the malt factory are not only less frequent, but also counterproductive. While emphasizing on the level of information sharing between them, interviewed manager of the Enterprise says:

> "The malt factory is less concerned about the quality of malt barley as much as we do. We produce and/or buy malt barley with an intention to clean for seeds in which case quality matters. Whereas, the malt factory buys malt barley for malting in which case quality might be compromised. Moreover, the factory is our rival than collaborator. Hence, we hardly share information."

The managers of the malt factory do not agree with this opinion of the manager of the enterprise. In their view, the ESE does not give sufficient attention to the multiplication and distribution of seeds of improved malt barley varieties. Otherwise, the factory tries its level best to improve malt barley quality through various interventions. However, the ESE does not have sufficient information on the interventions since information sharing is low. The low level of information sharing between the factory and the enterprise weakened the MBVC integration. Hence, we propose the following.

Proposition 2: *The lower the level of information sharing between value chain members, the weaker the VCI.*

As mentioned earlier, the choice of governance mechanisms is a big challenge to value chain members (Peterson et al., 2001; Gellynck and Molnár, 2009). The horizontal and vertical structures of the value chain determine the level of such challenges (Stock et al., 2000). The fit between governance mechanisms under use and transaction circumstances such as members involved, level of trust, and distribution of power strengthens VCI. A stringent governance mechanism frustrates value chain members and pressurizes them to leave than to actively participate in the value chain (Dolan and Humphrey, 2000).

In the view of Mungandi et al. (2012), the level of trust is a key governance mechanism that encourages value chain members to integrate the entire chain to avoid transactional risks. When trust level is low, very stringent and costly quality monitoring measures are designed to control the actions of other chain members (Kwon and Suh, 2004; Bezuidenhout et al., 2012). In

the view of interviewed farmers, for instance, the trust level between farmers and traders is low. One of the interviewed farmers explains it as follows:

> "Traders are too opportunists to trust. They earn higher profit margins and accumulate wealth at the expenses of farmers. Though they pay exploitative prices, farmers accept these prices due to lack of alternatives markets, weak cooperatives and bureaucratic procurement system of the malt factory. Moreover, traders collude to lower prices. They also adjust measurement scales to read less than the actual weight."

Similar finding was reported by Kambewa (2007) in her study on the Nile Perch value chain, in which case traders collude to keep prices low. In the view of interviewed malt factory managers, traders' malfeasances has caused hostile working relationships with them which lowered VCP. One of the interviewed managers explains the situation as follows:

> "Since most traders are highly opportunistic, they threaten quality through adulteration of good quality malt barley with poor ones to satisfy their greedy profit motives which sabotages the overall goals of the value chain. With such malpractices of traders, inferior quality of malt barley remains to be the major challenge to the chain no matter what other value chain members would do at their sphere to improve quality."

By the virtue of low level of trust in traders, the malt factory undertakes strict quality control. Quality verification at the factory takes long time and entails higher costs. Such quality control exposed traders to extra expenses. Traders have no option than to comply with quality control procedures set by the malt factory which is a monopsony. Traders are dissatisfied with unfriendly treatment of the malt factory. In their view, the malt factory is irrational in blaming all traders for the act of opportunism though there are still traders committed to ethical standards.

In the developed parts of the world, contact is another governance mechanism widely used to facilitate transactions execution in agribusiness value chains (Mungandi et al., 2012). In the view of the authors, contract somehow solves most of the problems that small-scale farmers face such as lack of access to new technologies, inputs and markets, and price volatility. The authors explain the benefits that contract offers to large agro-food companies by enabling them control

the delivery of the required inputs. During the 2012 planting season, Heineken N.V. started contract-farming through its CREATE project with 4,500 farmers to whom seeds of two newly tested varieties, *Traveler and Grace*, were distributed out of which good results were obtained. The use of these varieties have doubled malt barley productivity and shown a positive sign to strengthen VCI. In the view of the project coordinator, these seeds were distributed to farmers through existing cooperatives after revitalization, newly organized cooperatives, and through model farmers since it is easier to deal with few organized groups than with many individual farmers. The ESE is a pioneer to start contract farming with few hundreds of farmers few years ago and promising results were obtained. Meta-Diageo brewery has also started contract farming with about 6,000 farmers last year through viable cooperatives with the target of reaching 50,000 farmers by 2017 if the pilot project yields good results.

Even though spot market is a widely used mode of transaction governance in developing countries (Vieira and Traill, 2008), its use in a pure form across the entire value chain is unlikely (Mikkola, 2008). Different transaction governance forms are practiced at different links or mix of multiple forms could be used at some interfaces. In paragraphs that follow, we briefly describe how transactions are governed in the MBVC and the implication of that on VCI.

Farmers-Traders: transactions at this interface are mostly governed by market prices as there are many buyers and sellers and partly through relational mechanism since most of the traders belong to the rural community being sons/daughters of the farmers. Though relationships play key roles in transaction governance, traders have more power of influence over farmers. Some traders provide malt barley seeds on credit basis to cash-strap farmers with an intent of influencing their future actions (Maertens and Swinnen, 2012). Such provision of credit gives the *creditor-trader* the option of having the first purchase of malt barley from the *debtor-farmers* up on harvest as means of settlement of the credit.

Farmers-Cooperatives: Though membership contract suits transactions governance at this interface (Gellynck and Molnár, 2009), it is not the case for the MBVC in Ethiopia. In this chain, cooperatives are very weak to adopt this mechanism. This is partly due to negligible ownership equity amount of member- farmers in cooperatives. Cooperatives can hardly influence its

members' actions with such insignificant equity ownership of member-farmers. Hence, farmers can easily drift out to traders to search for attractive profit margin.

Traders-AMF: Transactions at this interface are complex and difficult to govern. Formal contacts are not used at this interface. Though transactions are highly frequent, these members do not consider each other as a partner. Traders feel ignored while the malt factory complains about the opportunistic behavior of traders and they are not in good terms. The malt factory is such a dominant member in the MBVC that it sets the quality grades and prices which traders and farmers can only take if they decide to supply to the factory.

AMF-Breweries: Transactions at this interface are governed through the use of formal contracts. In the contract, parameters like quantity, quality, price, delivery schedules and terms of shipment are stipulated. Often times, terms of shipment are FOB shipping point whereby breweries bear freight costs and risks of loss while the shipment is in transit. Most often, breweries transport themselves, otherwise, they ask the malt factory so that the cost would be reimbursed later.

Breweries-Distribution agents: According to marketing managers at breweries, agents are chosen through tender competition and transactions with them are often governed by written contracts. The contract stipulates the duties of both parties. It demands the agents to operate within their sales territories, make sales data accessible for inspection, cooperate with market developers, mobilize resources promised for the enactment of the contract, avoid inventory stock-out, return borrowed properties like containers, and avoid the sale of competing products. In the same manner, the contract obliges breweries to deliver products with right quality and quantity, support promotion activities, provide required trainings to agents and their staff, assign qualified supervisors and promoters, and arrange regular meetings with agents to identify market problems and to jointly search for solutions. In relative terms, better integration was observed at this interface than any other interfaces in the MBVC and can be replicated to other interfaces.

Based on the above discourse regarding the governance of transactions at various interfaces of the MBVC, we propose the following.

Proposition 3: *The less effective the governance mechanisms at various interfaces in the value chain, the weaker the VCI.*

2.4.2. MBVC integration

In this study, VCI is conceptualized in terms of collaboration among members, coordination of activities along the value chain interfaces, commitment towards long-term relationships and readiness to make joint decisions. Though production managers of breweries and their counterparts in the malt factory meet regularly to discuss how to improve chain's integration and performance, significant results were not obtained. Since recently, meteoric opportunities were opened up, uniquely for farmers following the entrance of multinational breweries. Prior to their entry, local breweries failed to recognize the strategic importance of local sourcing to strengthen VCI and raise VCP. Moreover, top-level managers of breweries by then were not experts of value chain management (Slone et al., 2007).

As pointed out earlier, members' readiness to make joint decisions is one construct of VCI (Min et al., 2005). In the view of interviewed farmers, farmers do planning together with cooperatives. The Agricultural Growth Strategy of Ethiopia requires farmers to prepare annual plans with the help of DAs to properly manage own farming business. These plans are shared with cooperatives for better alignment of activities. But, farmers and traders neither plan together nor share information on their respective plans. The malt factory does not involve other members in its planning and decision making processes. Few years ago, the malt factory established a research fund to which breweries also contribute to support the joint Malt Barley Development Research Project at Kulumsa Agricultural Research Centre (KARC). The project could not deliver expected results due to high mobility of researchers and lack of proper monitoring and evaluation by fund providers.

In the view of interviewed key informants, collaboration among MBVC members and other stakeholders such as EIAR, ATA, agricultural research centers on malt barley seed development

is very poor irrespective of low productivity and poor quality of malt barley in the study area due to the use of outdated seeds. Most interviewed farmers do not understand the influence of malt barley quality on the quality of beer. As members at the upstream tier of the chain, farmers are expected to know the needs of other members so as to enhance the integration and performance of the chain.

In the view of the Head of the Agribusiness Department of Meta-Diageo brewing factory, the quantity and quality of malt barley production can be significantly improved through the use of improved seeds alone. The manager further explained that there is high level of farmers' frustration with the current very low average productivity level of 1.9 tons per hectare with poor quality compared to 7 to 8 tons per hectare in Europe for instance. The use of improved seeds alone can double the productivity of malt barley. If the required volume and quality of malt are locally produced, breweries are relieved from the hassles involved in malt importation.

In the MBVC, cooperatives are expected to catalyze the flows of information, materials, and technologies. But most cooperatives could not even negotiate with AMF on terms of sales leave alone to fulfill the higher expectations of farmers. One interviewed farmer contemplates:

> "Farmers would sooner or later abandon malt barley production and resort to the production of either food barley or wheat due to low yield obtainable for malt barley though requiring more efforts. Farmers should be paid attractive prices and/or supplied with agricultural inputs and technologies that can increase malt barley productivity in folds."

Past studies also indicated that value chain members switch to other products when existing products do not pay off (Lambert and Cooper, 2000; Gagalyuk and Hanf, 2011; Tessema, 2012). Cooperative organizations in the study area are weak to provide the required supports to farmers mainly due to the following reasons. Firstly, farmers have bitter memories of bad legacies that cooperatives left in the past. Secondly, cooperatives are managed by elected members for their behavioral qualities than managerial skills, as combination is difficult to find in rural setting. Thirdly, these managers are not incentivized for serving. Fourthly, stiff competition from persuasive and flexible traders. Lastly, poor support provided by District Cooperative Promotion Offices.

Even though breweries have the capacity to go beyond the malt factory to support farmers' integration to the chain, they rather pay more attention to their demand sides. They invest immense amount of resources in promotion and distribution activities while these activities can be outsourced. The marketing divisions of breweries are better organized than their procurement divisions. Breweries left the supply side of their chain to suppliers. However, the concept of VCI is given considerable weight after the entrance of multinational breweries. Hence, we finally propose the following.

Proposition 4: *The weaker the integration of the value chain, the lower the VCP.*

2.4.3. The MBVC performance

As explained earlier, quality, flexibility, responsiveness and efficiency are used to measure VCP in most of the cases (Aramyan et al., 2007; Zhou and Benton Jr, 2007; Molnár, 2010; Fattahi et al., 2013). Performance measurement parameters and methods should be standardized across the value chain tiers to achieve stronger VCI and higher VCP outcomes (Simatupang and Sridharan, 2008; Espinoza et al., 2010).

In the MBVC, farmers do measure their performances in terms of goal achievements. However, majority of interviewed farmers are unhappy with the level of goals achievements. Farmers do also measure performance in terms of the quality of malt barley they produce. In the view of the farmers, quality is the measure of grain moisture and purity, color and cleanness. Farmers are also interested in increasing malt barley productivity per hectare which is a measure of efficiency and most of them are not happy with malt barley yield which is about 2 tons per hectare which is constrained by the use of outdated seeds and shortage of other agricultural inputs. This productivity rate for malt barley is too small compared to that of 7 to 8 tons per hectare for Europe. Responsiveness and flexibility are less understood by farmers as performance measurement indicators. The lack and shortage of improved seeds and other agricultural inputs, non-responsive price to quality, absence of loans, information asymmetry, and low level of trust between value chain members are identified as major factors constraining integration and performance at farmers' interfaces.

On the other hand, cooperatives staff do measure performance in terms of their achievements in linking farmers to the downstream large agro-food processors for sustainable and attractive market opportunities for the malt barley. Cooperatives organizations also measure their performance in terms of level of satisfying the needs of the farmers for agricultural inputs. The aggregate supply to AMF through cooperatives is less than 10 percent of the total factory's local sourcing which indicates poor performance of cooperatives. The main causes for these are lack of flexibility of cooperatives to adjust their prices in tandem with that of traders', low level of farmers' interest to sell to cooperatives due to low level of trust, limited capacity and working-capital, poor managerial skills of cooperative leaders, and more engagement on input provision for malt barley farming than on the commercialization of the crop. The malt barley supplied through cooperatives are always of poor quality grades not because of opportunism as it is a case with traders but due to inability of cooperative staff to differentiate malt barley varieties and qualities at times of collections from farmers.

Traders measure performance in terms of inventory turnover as they ration their limited working capital among various agricultural crops. For traders, efficiency is the most critical performance indicator since they work under situation of capital rationing. Moreover, traders wait longer to collect their receivables from the malt barley sales on credit as the malt factory delays payment for couple of months after sales which has a negative influence on their performance. Some traders also measure performance in terms of malt barley quality, in which case, first grade implies best performance whereas, the last grade corresponds to least performance.

According to the production manager of the malt factory, the factory measures performance in terms of the volume of malt produced during the given period and the extent to which quality guidelines were met. These quality standards were adopted from the European Brewery Convention (EBC). The quality of malt is determined by the amount of extractable wort. Accordingly, local malt is with low level of wort mainly due to poor quality of the local malt barley in terms of grain size, moisture level, protein content, and germination capacity. The major cause for this is the weak MBVC integration. As the malt factory uses world-class malting

technologies, the poor quality of malt produced by the factory can mainly be attributable to the poor quality of malt barley supplied from the local sources.

Even though all breweries are ISO certified ones for meeting the required quality guidelines, as indicated by their production managers, still there is a long way to go to reach at the performance frontier. These breweries could not achieve as much as they should due to less quantity and poor quality of malt coming from the local source. Moreover, the malt is not available for delivery just-on-time due to weak coordination of activities as information sharing on production and distribution activities are very poor.

2.5. Conclusions and practical implications

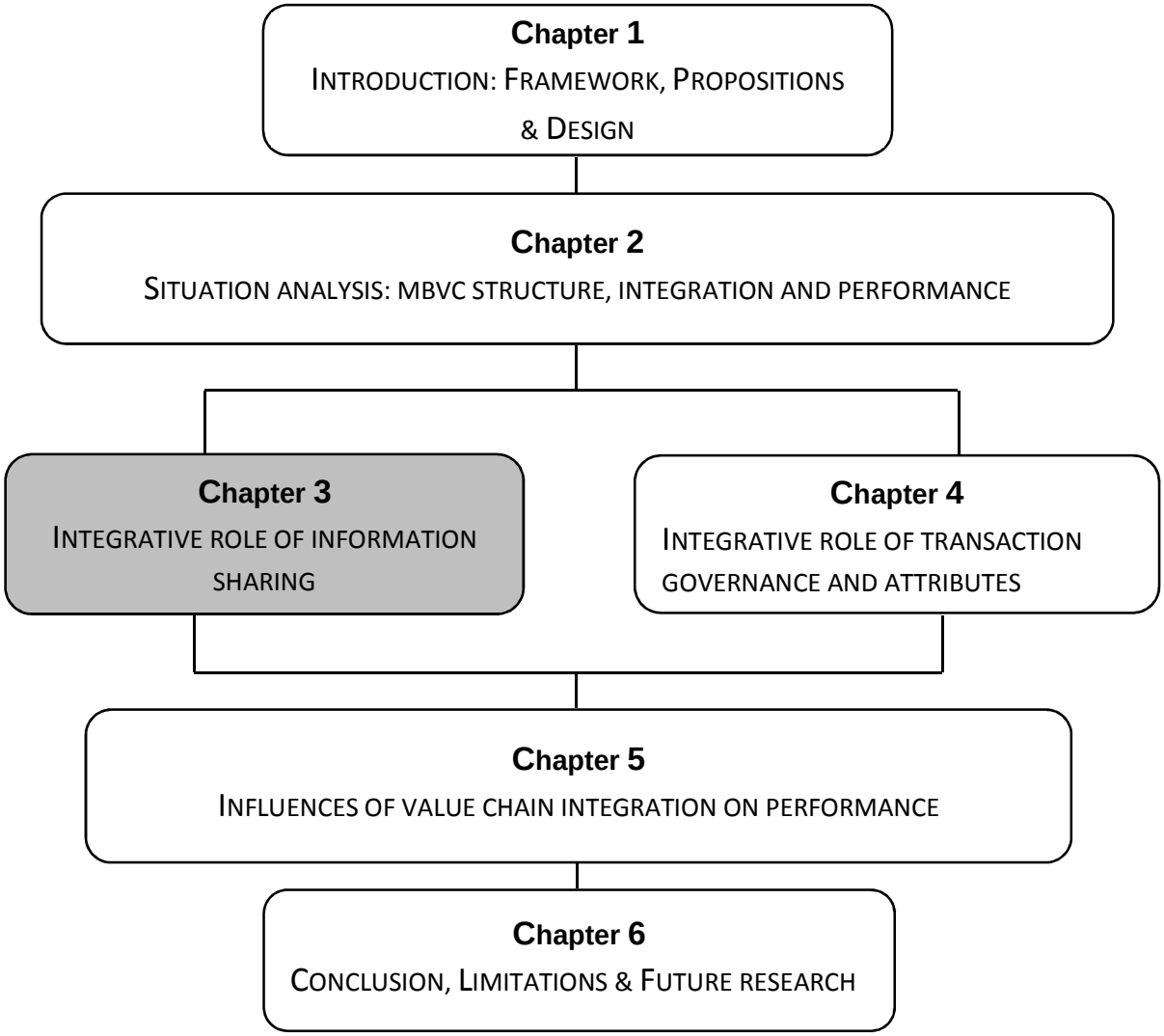
The case study reported in this chapter has paid a particular attention to the geographic dispersion of value chain members, the horizontal and vertical arrangements of these members within and along value chain tiers, the governance of exchange transactions, the level of information sharing between value chain members and how VCI is influenced by VCS constructs and how VCI constructs, in turn, influence VCP with special reference to the MBVC in Ethiopia. We explored how farmers, cooperatives, traders, the malt factory and breweries are interconnected and which VCG mechanisms are used to govern these interactions at the studied interfaces. The study revealed that the MBVC is characterized by disperse geographic locations of its members, wider-vertical mostly at the upstream (i.e. farmers and traders) tiers, and longer-horizontal arrangements of chain's tiers, and the use of ineffective transaction governance mechanisms which contributed to the weak MBVC integration which in turn lowered chain's performance.

The study identified variations among MBVC members in terms of volume and quality of information being generated and shared between the MBVC members. The upstream MBVC members have less volume and poor quality of information compared to members in the downstream tiers and the situation improves as one moves down along the value chain tiers. The variation in the level of information generated emanates mainly from variations in terms of the capacity of MBVC members to generate information and the access that these members have to information sources. For instance, farmers and cooperatives have insufficient

information than any other members in the MBVC due to their limited information generating capacity and limited access to information sources. Moreover, the breweries and the malt factory are less willing to share information on product specifications to the upstream members though information is quite useful to support decision making.

The study identified several fragmentations in the MBVC structure which are causes for the weak integration and low performance of the chain. The quality of malt barley produced by small-scale farmers in the study area is very low. Cooperative organizations are poorly structured and loosely organized to make bulk collection of malt barley. Traders are extensively engaged in the adulteration of good quality malt barley with inferior ones to serve their egoistic profit derives. The members of the MBVC collaborate less on the development of improved malt barley seeds though the use of outdated malt barley seeds is the major hindrance to the MBVC integration and performance.

This study has provided a broader conceptual framework that depicts the interplays between VCS constructs and VCI and between VCI constructs and VCP. The framework can be replicated for similar studies on agribusiness value chains in Sub-Sahara Africa for better generalizability of the findings. This study also provides important managerial insights related to the structure, integration and performance of the MBVC in Ethiopia. This chapter also provided important propositions to be taken up in subsequent chapters for in-depth investigation. The disperse geographic locations of members, the less volume and poor quality information being shared between the value chain members through traditional communication channels, the use of ineffective transaction governance mechanism, poorly structured and loosely organized cooperatives organizations, poor agricultural research system and absence of common platform for partnership are some of the factors that weakened MBVC integration and lowered its performance. Therefore, the MBVC members and their stakeholders should work against these causes to strengthen the integration and improve the performance of the chain for better sustainability.


Chapter 1
INTRODUCTION: FRAMEWORK, PROPOSITIONS & DESIGN
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Chapter 3

The Integrative Role of Information Sharing along the value chain

The chapter is based on:

Watabaji, M. D., Molnár, A., Weaver, R. D, Dora, M.K., and Gellynck, X. (2016). Information sharing and its integrative role: An empirical study of the malt barley value chain in Ethiopia. *British Food Journal, 118*(12), 3012 - 3029.

Gellynck, X., Watabaji, M. D., Molnár, A., and Dora, M. K. (2015, 09-13 February). Information sharing: the case of the malt barley value chain in Ethiopia, 9th International European Forum on System Dynamics and Innovation in Food Networks, Innsbruck, Austria

3. The integrative role of information sharing along the value chain

3.1. Introduction and objectives

It is now several decades since information sharing between value chain members attracted the attention of researchers (Cooper et al., 1997; Kembro et al., 2014) information being a valuable commodity (Dewett and Jones, 2001) that enables value chain integration, henceforth VCI (Bagchi and Skjoett-Larsen, 2003; Awad, 2010; Lotfi, Mukhtar, et al., 2013). It is important under two conditions. First, when the achievement of value chain members' goals is influenced by the actions of other value chain members. Second, when these members differ in the know-how though they are interdependent, then information sharing enhances VCI. In both cases, information sharing glues value chain members together (Romano, 2003).

Information sharing helps value chain members to know more about the circumstances of their value chain partners and eases the alignments of operational and strategic plans (Holweg et al., 2005). It strengthens collaborations among members with various competencies (Munyua and Stilwell, 2013) and eases coordination of activities along the value chain interfaces (Bagchi and Skjoett-Larsen, 2003). However, value chain wide information sharing is quite difficult for value chain members that receive different incentives to share information (Cousins et al., 2006). Information sharing between the value chain members has both benefits (i.e. supports decision making) and costs (i.e. for gathering, processing and sharing it with their chain partners) and the resultant benefits or costs would determine value chain members' decisions whether to share the information (Frohlich and Westbrook, 2002; Handfield and Bechtel, 2002).

For this study, we formulated a model that envisages the correlations between three information sharing variables (i.e. information volume, information quality and communication channels use) and VCI. In the study by Handfield and Bechtel (2002), information volume is defined as the number of items and attributes provided to describe alternatives, and information quality refers to the usefulness of information for value chain

members while assessing the relative importance of alternatives. For the purpose of this study, we defined volume of information as a latent construct to explain the breadth (i.e. variety) and depth (i.e. details involved) of information shared between value chain members to support decisions whereas information quality is a measure of accuracy, timeliness and relevance of the information shared. Communication channels use is understood as the extent of media (i.e. interpersonal or written; traditional or modern) utilization for sharing information between value chain members.

The mere participation in the value chain requires members to integrate as competitions are shifted from between individual-members to between value chains (Rosenzweig et al., 2003; Gellynck and Molnár, 2009). In the view of Bagchi et al. (2005), VCI is all about managing the flows of material, service, financial and knowledge along the value chain interfaces as if these flows occur within a single vertically integrated entity so as to deliver superior value to customers. In this study, VCI is conceptualized to mean collaboration among value chain members through resources, capabilities and risks sharing (Childerhouse et al., 2011), commitment of value chain members towards long-term relationships (Vanpoucke, 2009; Awad, 2010), coordination of activities along the value chain interfaces (Wever et al., 2009; Awad, 2010), and joint decision making on key strategic and operational issues (Malhotra et al., 2005). Since past studies noted that VCI results in higher performance outcomes (Bagchi et al., 2005; Zhao et al., 2011), this study focuses rather on the relationship between information sharing constructs and VCI.

Although many past studies noted a positive association between information sharing and VCI (Vickery et al., 2003; Gunasekaran and Ngai, 2004; Awad and Nassar, 2010; Munyua and Stilwell, 2013), the metrics of information sharing as a latent variable were not fully elaborated. In previous studies, information sharing was considered either as an element of VCI (Moberg et al., 2002; Wu et al., 2006; Pandey et al., 2010; Yigitbasioglu, 2010) or as an antecedent of value chain performance but its causal relationship with VCI was not investigated as such (Yu et al., 2001; Malhotra et al., 2005; Slone et al., 2007; Simatupang and Sridharan, 2008; Vaart and Donk, 2008; Hartono et al., 2010; Wiengarten et al., 2010; Wu et al., 2014). Furthermore, the latent constructs of information sharing (i.e. information

volume, information quality and communication channels use) were not elaborated in past studies (Vanpoucke, 2009). Moreover, past studies considered the association between information sharing and VCI only at dyadic level (Vickery et al., 2003; Li et al., 2005; Lotfi, Mukhtar, et al., 2013; Caridi et al., 2014).

Therefore, in this chapter, we investigate the association between information sharing constructs and VCI at multi-level MBVC which is highly relevant (Choi and Liker, 2002; Meixell and Gargeya, 2005; Giunipero et al., 2008; Bastl et al., 2012). The dyadic studies done in the past could not address the salient constructs of information sharing (Wu et al., 2014) and their correlation with VCI (Sanders, 2008). Though literature exists to establish a positive relationship between information sharing as a variable and VCI, there are no sufficient empirical evidences (Kim and Narasimhan, 2002; Kembro and Näslund, 2014). Therefore, the study presented in this chapter would make important empirical and conceptual contributions as it investigates the multi-dimensional constructs of information sharing and their correlation with VCI (Arshinder and Deshmukh, 2008; Lotfi, Mukhtar, et al., 2013). The investigation is made .based on data obtained from the MBVC in Ethiopia, where information sharing constructs are given less attention while they are the central methods to achieve VCI.

Therefore, by considering information sharing as a unit of analysis this chapter aims to: (1) conceptualize multi-dimensional constructs of information sharing and VCI; (2) identify barriers to information sharing between the MBVC members, (3) measure the levels of information volume and quality, and channels use in the MBVC; and (4) investigate the interplays between the multi-dimensional constructs of information sharing and VCI. Last but not least, the study aims to draw important policy recommendations to improve MBVC integration and performance.

The chapter is structured as follows. In the next section, a brief theoretical framework is presented. Next, the research methodology is thoroughly described followed by the analysis of the relevant data and discussion of key results. Finally, conclusions are drawn and practical implications are pinpointed.

3.2. Theoretical background and conceptual framework

Based on the simple analogy that information sharing between value chain members reduces uncertainty, one of the determinants of transaction costs (Williamson, 1985; Yigitbasioglu, 2010), transaction cost analysis (TCA) lays the theoretical foundation for our conceptual framework that associates information sharing with VCI. Moreover, our conceptual framework found some parts of its roots in the resource based view (RBV) since knowledge which is a key resource (intangible capabilities) is transferred from one value chain member to the other through information sharing to strengthen VCI. As indicated in the previous chapters, VCI is defined as the state or condition of interdependence among value chain members which differs due to varying volume of the possessed information and the types of information technologies accessible to these members. It is the result of members' actions to exploit opportunities to enhance performance.

Information sharing between value chain members improves members' knowledge, reduces search costs, and leads to convergent forecasts (Li and Lin, 2006; Wever et al., 2009; Wu et al., 2014). It enhances coordination of activities (Vanpoucke, 2009). As noted by these authors, information sharing is a key towards VCI. For example, stock-outs and stock repetition can be avoided when value chain members share information on inventory balances (Kulp et al., 2004; Lotfi, Mukhtar, et al., 2013). Information sharing on consumers' demand facilitates order fulfillment. Likewise, information sharing on new products enable on time delivery of the required inputs for its production.

In their studies Ketzenberg (2009) and Li and Lin (2006) argue that information sharing leads to strong VCI as value chain members are better informed about needs of their customers. Activities in the value chains are well-coordinated when the right volume and good quality information is shared between members. Moreover, information sharing creates a conducive environment for collaboration (Bagchi and Skjoett-Larsen, 2003). In the contrary, value chain members could intentionally hold information for opportunistic purpose (Bagchi and Skjoett-Larsen, 2003). In such a case, focal members should encourage free flow of information in the value chain.

3.2.1. Characteristics of information

In the context of value chain, information sharing refers to the transfer of knowledge between value chain members (Vanpoucke, 2009). This knowledge mainly includes information on production or operation capacities, plans and goals, product and service specifications, prices and demands, inventory balances, contemplated changes and so forth. Strong VCI would exist when mid-stream members transfer demand and delivery information upstream and downstream the value chain respectively. Based on the study of Prajogo and Olhager (2012), we identified information volume, information quality and communication channels use as key constructs of information sharing.

Information volume refers to the breadth (i.e. varieties) and depth (i.e. details) of information being shared between value chain members to meet their requirements. In the of view Pandey et al. (2010) and Lotfi, Mukhtar, et al. (2013), for example, information on demands and prices forecasts, inventory balances, production and procurement plans, current capacities and expansion plans, and sales and purchase orders are important if shared. On the other hand, information depth refers to whether the information shared contains every necessary tips and details to guide the receivers to perform the intended tasks. Information volume can be low or zero when value chain members do not share any sort of information and high when value chain members are transparent to share every types of information with the required details (Sahin and Robinson, 2002). Though the influence of information volume on VCI was not studied as such, Handfield and Bechtel (2002) empirically showed that the functional relationship between information volume and decision effectiveness is an inverted U. That shows an association between poor decisions and insufficient volume of information both in terms of types and details on the one extreme end and information overload on the other.

Information quality refers to the power of information to bring about higher performance outcomes both at individual member- and chain-levels (Zhou and Benton Jr, 2007). More specifically, information quality is characterized by the accuracy, relevance and timeliness of the shared information (Zhou and Benton Jr, 2007; Gorla et al., 2010; Fischer, 2013; Popovič

et al., 2014). Information is considered accurate when correct and free from distortions; information is said to be relevant when it is useful and appropriate to support the decision at hand; and information is timely when it is shared on time to keep the receiver in tandem. The study by Daft and Lengel (1986) has noted a positive relationship between information quality and VCI.

Communication channels use refers to the frequency of media usage for information sharing (e.g. face-to-face contact, telephone, fax, electronic data interchange (EDI), Web-enabled portals such as Internet and intranet) (Kembro et al., 2014). The traditional communication channels use leads to smooth flow of information between value chain members as compared to the advanced communication channels use due to their acceptability, ease to use and cheapness in terms of costs (Dewett and Jones, 2001).

3.2.2. Value chain integration (VCI)

As indicated in the previous chapter, VCI is defined based on four key constructs: collaboration among chain members; commitment towards long-term relationships; coordination of activities along the value chain interfaces; and joint-decisions making.

collaboration refers to the readiness of value chain members to share resources, capabilities and risks (Mason-Jones and Towill, 1997; Arshinder and Deshmukh, 2008; Vieira et al., 2009; Wu et al., 2014). *Commitment* refers to the willingness of value chain members to extend efforts that keep them in relationship for longer duration (Morgan and Hunt, 1994; Bastl et al., 2012). *Coordination* is an act of managing interdependencies of activities like purchasing, operation and logistics along the value chain interfaces (Simatupang et al., 2002; Arshinder and Deshmukh, 2008). In the view of Malhotra et al. (2005), j*oint decision making* refers to the level of participation of value chain members on the decisions making processes of their value chain partners.

Based on literature, both conceptual framework and research hypotheses were formulated, see Figure 8 for the conceptual framework. The main constructs in the conceptual framework are shown in bold while indicators are listed under each construct.

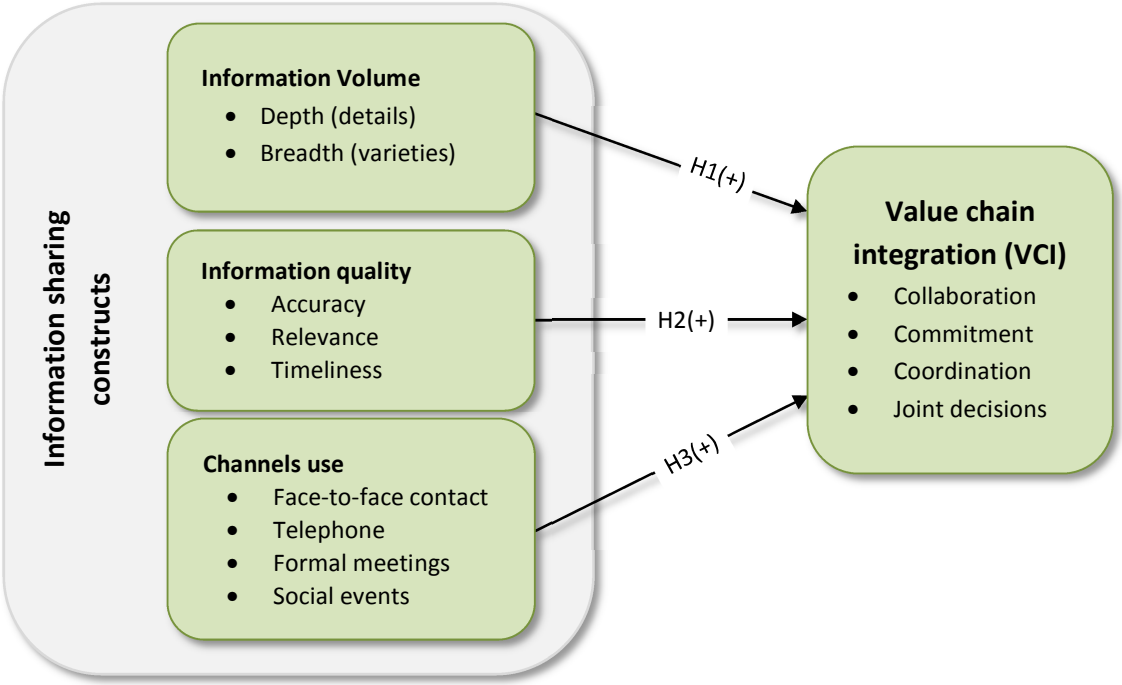


Figure 8: Conceptual framework linking information sharing constructs to VCI
Source: Own formulation based on Prajogo and Olhager (2012)

As depicted in the conceptual framework, the study provides empirical evidences to support the causal-relationships proposed in the following hypotheses.

Hypothesis 1: *The volume of information shared between MBVC members positively relates to the strength of VCI.*

Hypothesis 2: *The quality of information shared between MBVC members positively relates to the strength of VCI.*

Hypothesis 3: *The extent of communication channels use for information sharing between MBVC members positively relates to the strength of VCI.*

3.3. Research methodology

Since our key constructs are not directly observable by respondents, we used observable indicators described in the previous section to measure these constructs. Empirically, we estimate a multiple indicators model from which to draw inferences concerning the hypotheses of our interest. We employed a survey method of data collection on those indicators shown in our conceptual framework. Qualitative interview responses were also compiled to complement the survey data.

3.3.1. Scope and Sampling

The sample domain for this study consists of members of the MBVC in Ethiopia. For the field survey, sample farmers and traders were drawn from four selected districts of Arsi and West Arsi administrative zones. These districts were selected for their wide malt barley coverage and high production of marketable surplus malt barley (Legesse et al., 2007; Kassahun, 2011). Key informants for interviews were identified from among farmers, traders, cooperatives staff, and managers at AMF, the only malt plant in the study area.

As explained under section 1.4 of chapter one, survey data were collected from a sample of 320 farmers and 100 traders selected from four districts, our study area, see Table 3 for respondents' profile. In addition to survey data, qualitative interview responses were compiled from 62 key informants of which 27 were farmers, 13 were traders, 17 were cooperatives staff, and 5 were managers at AMF. For all interviews, key informants were selected from among knowledgeable MBVC members on issues related to information sharing constructs and their influence on the MBVC integration (Li and Lin, 2006; Vanpoucke, 2009).

Table 3: Respondents' profile

Characteristic	Farmers		Traders	
	Freq.	**Percent**	**Freq.**	**Percent**
Mobile phone				
Yes	215	67.8	100	100.0
No	105	32.3	0	0.0
Gender distribution				
Male	301	94.1	98	98.0
Female	19	5.9	2	2.0
Age distribution				
<= 20 years	2	0.6	2	2.0
21-40 years	202	63.1	68	68.0
41-50 years	72	22.5	23	23.0
>= 51 years	44	13.8	7	7.0
Educational status				
Not formal education	43	13.4	0	0
Read and write	60	18.8	2	2.0
Primary school	141	44.1	31	31.0
Secondary school	65	20.3	58	58.0
College/university	11	3.4	9	9.0
Work experience				
<= 5 years	41	12.8	36	36.0
6-10 years	120	43	34	34.0
11-15 years	43	13.4	25	25.0
16-20 years	54	16.9	3	3.0
>=20 years	62	19.4	2	2.0

Source: Survey responses

3.3.2. Measurement scale and validation

In this study, information volume, information quality and communication channels use were treated as explanatory variables that influence our outcome variable, i.e. VCI. Respondents were asked to rate the extent of their agreement on various indicators of information volume and information quality on the five-point scale where 1 is 'strongly disagree' and 5 is 'strongly agree' and the extent of communication channels use on a five-point scale where 1 is 'very low' and 5 is 'very high' (Gorla et al., 2010; Pandey et al., 2010; Du et al., 2012; Fischer, 2013; Popovič et al., 2014). Similarly, respondents were asked to express the extent of their agreement or disagreement on VCI constructs indicators (statements) on the same five-point scale.

3.3.3. Data analysis

The analyses presented in this chapter are based on both survey data and interview responses. Descriptive statistics like median values and Interquartile Ranges (IQR) were used to measure the level of information sharing. We used median values and IQR instead of mean values and standard deviations given the ordinal nature of our data set (Molnár, 2010). For ordinal data, mean values indicate non-existing location estimates within the range of scales. The IQR is the difference between the 75^{th} and 25^{th} percentiles which includes the middle 50 percent of values to ensure the negligibility of the effects of outliers. Advanced statistics such as factor loads, Cronbach's alpha scores, ordered logit (Ologit) regression coefficients and marginal effects were used for data analysis.

Within scale factor loadings and Cronbach's alpha scores were used to validate multi-item measures (Narasimhan and Nair, 2005; Pandey et al., 2010; Tessema, 2012). While extracting factor loads, we used principal component method, un-rotated factors solution display, by fixing the number of factors to 1 for each latent variable, since our observable measurement indicators under each latent variables were extracted from past studies. The factor loads were used to ensure construct validity of the set of indicators of latent variables, both explanatory and dependent (Zhou and Benton Jr, 2007). As suggested by Narasimhan and Nair (2005) and Vanpoucke (2009), indicators that loaded lower than 0.60 were dropped from further analysis. The Cronbach's alpha scores were used to measure the internal consistency of indicators of each variable. All scores are greater than 0.60 to demonstrate sufficient consistency of those indicators (Moberg et al., 2002; Zhou and Benton Jr, 2007; Wu et al., 2014).

The summated median values were used for each latent variable (Li and Lin, 2006; Pandey et al., 2010). The four constructs of VCI, our dependent variable, are latent variables themselves and were measured using average median values of several observable indicators used as proxy measurements for the constructs/variables. These observable proxy indicators of VCI constructs were presented in the fifth chapter of this dissertation where the constructs were considered as explanatory variables for VCP.

Since respondents have low analytical capacity to make objective distinction on the ordinal Likert Scale measurement, the intervals between consecutive orders are unequal and hence the use of ordered logit regression is appropriate. The cut-off points provided by ordered logit regression are different from 1 and also significant to substantiate the non-equality of the intervals. Moreover, the degree of skewedness of our dependent variable is as high as negative 0.7 at some of the studied interfaces to show that Ordinary Least Square (OLS) or Probit regression models are not appropriate to use for the analysis of our data sets.

Since ordered logit regression model is based on the parallel regression assumption, the approximate likelihood-ratio tests were carried out using Stata syntax, Omodel logit, to see if the assumption was fulfilled. The parallel regression assumption is said to be met when the *p*-values of the approximate likelihood-ratio tests are greater than 0.05. In our case, the *p*-values are 0.017 and 0.084 at cooperatives-farmers and farmers-traders interfaces respectively based on farmers' survey data and 0.058 and 0.052 at farmers-traders and traders-malt factory interfaces respectively based on traders' survey data. These show that the parallel regression assumption was fulfilled at those interfaces, except between cooperatives and farmers. Therefore, ordered logit regression coefficients and the marginal effects of the independent variables (i.e. information sharing constructs) on the dependent variable (i.e. VCI) were generated to explain the interplay between our independent and dependent variables.

3.4. Results and discussions

In this section, we presented the results of both descriptive and regression analyses regarding the status of information sharing and VCI and the relationships between constructs of information sharing and VCI.

3.4.1. Descriptive statistics

The descriptive statistics presented in Table 4 and Table 5 show the levels of information volume, information quality, communication channels use, and VCI at various MBVC interfaces. According to median values reported in Table 4, sufficient volume of information

is being shared at cooperatives-farmers interface than at farmers-traders interface. Similarly, median values of information quality indicators are slightly higher at cooperative-farmers interface than those at farmers-traders interface to signal respondents agreement that quality information is shared at the former interface.

According to the descriptive statistics and interview responses, neither farmers nor traders use fax, electronic- and snail-mails, and other advanced web-based technologies to share information with their chain partners. The higher median values based on farmers' survey show respondents' agreement that face-to-face, phone calls, formal and informal meetings are frequently used at cooperatives-farmers interface than at farmers-traders interface. This is mainly due to easy access to communication channels at the former interface. Respondents have also agreed that formal and informal meetings are rarely used at farmers-traders interface than at cooperatives-farmers interface. According to farmers' opinion, information on input prices is shared with cooperative staff while attending social events. The use of informal meeting as a means of sharing information at farmers-traders interface is low since traders rarely attend social events, see Table 4. The overall assessment of median values of indicators of information sharing variables show that more information with good quality is shared at cooperatives-farmers interface than at farmers-traders interface.

During the survey, farmers were provided with list of barriers to information sharing compiled from the literature and asked to identify those relevant to their contexts. Accordingly, 78.4 and 82.5 percent farmer-respondents identified inconsistent information system as a barrier to information sharing at cooperatives-farmers and farmers-traders interfaces respectively. The lack of information sharing plans constrains information sharing at cooperatives-farmers and farmers-traders interfaces according to 73 and 79.7 percent of farmer-respondents respectively. Lack of trust to share information limits information sharing at cooperatives-farmers and farmers-traders interfaces according to 65.1 and 76.5 percent of farmer-respondents respectively.

The median values reported in Table 4 for indicators of VCI show farmers' disagreement with integration statements at farmers-traders interface than at cooperatives-farmers interface.

Table 4**: Median, IQR, factor loading, and alpha scores (farmers' survey)**

***Construct*/Indictor**	**Cooperatives**		**Traders**	
	Median (IQR)	**Factor loading**	**Median (IQR)**	**Factor loading**
Information volume	*(α = 0.806)*		*(α = 0.752)*	
We provide varieties of information to chain partners	3.00(2.00)	0.811	3.00(2.00)	0.769
We receive varieties of information from chain partners	4.00(2.00)	0.832	2.00(1.00)	0.814
We provide detailed information to chain partners	2.00(1.00)	0.755	2.00(2.00)	0.792
We receive detailed information from chain partners	2.00(1.00)	0.806	2.00(1.00)	0.714
Information quality	*(α = 0.892)*		*(α =0.899)*	
We provide timely information to chain partners	3.00(2.00)	0.780	2.00(1.00)	0.706
We receive timely information from chain partners	3.00(2.00)	0.709	2.00(1.00)	0.795
We provide correct information to chain partners	4.00(1.00)	0.810	3.00(2.00)	0.755
We receive correct information from chain partners	3.00(2.00)	0.786	2.00(1.00)	0.764
We regularly visit chain partners to get firsthand information	drop	drop	2.00(1.00)	0.737
We are regularly visited by our partners for search of firsthand information	2.00(2.00)	0.652	3.00(1.00)	0.709
Information provided to chain partners supports their decisions	3.00(2.00)	0.750	2.00(1.00)	0.689
Information received from chain partners supports our decisions	3.00(2.00)	0.775	2.00(1.00)	0.793
Communication channels use	*(α = 0.843)*		*(α = 0.857)*	
We share information with chain partners face-to-face	3.00(2.00)	0.811	3.00(2.00)	0.825
We share information with chain partners through phones	3.00(2.00)	0.844	3.00(2.00)	0.798
We share information with chain partners during formal meetings	3.00(2.00)	0.781	2.00(2.00)	0.843
We share information with chain partners during social events	3.00(1.00)	0.864	2.00(2.00)	0.881
Value chain integration	*(α = 0.881)*		*(α = 0.760)*	
We and chain partners collaborate as if we are parts of a single firm	3.50(1.50)	0.857	2.50(1.00)	0.843
We and chain partners coordinate our activities end-to-end	3.00(1.00)	0.877	2.00(1.00)	0.871
We and chain partners are committed towards long-term relationships	3.00(1.50)	0.874	2.50(1.00)	0.866
We and chain partners jointly decide on critical operational and strategic issues	2.50(1.00)	0.841	2.00(1.00)	0.888

As it can be seen from Table 5, the median values at traders-AMF interface for indicators of information volume are high (i.e. 4.00) to signal traders' agreement that wide range and detailed information is shared between traders and the malt factory. This may be due to better access to various communication channels by both members. The face-to-face contact is the most widely used communication channels at farmers-traders interface whereas telephone calls are widely used at traders-AMF interface. At traders-malt factory interface,

formal meetings is the least used communication channel. Whereas, sharing information during informal meetings at social event between traders and farmers loaded less than the minimum threshold and hence dropped from further analysis.

The median values of indicators of information sharing variables at farmers-traders interface based on traders' survey data reveal that sufficient volume and good quality information is shared at this interface though farmers' survey did not support this view. We suspect traders' desirability bias to avoid risk of exclusiveness for the high median values obtained from traders' survey. Otherwise, it was pointed out by interviewed farmers that traders are highly reluctant to share sufficient volume and good quality information with traders. For instance, traders always try to weaken farmers' negotiation power by blocking prices and quality related information released by the malt factory from reaching to the farmers so as to keep malt barley prices as lower as possible.

Traders were also provided with the same list of barriers to information sharing and asked to identify the relevant ones in their contexts. Accordingly, the lack of training on the value of information and means of sharing constrains information sharing with farmers and AMF according to 93 and 91 percent of trader-respondents respectively. Likewise, 83 percent of trader-respondents indicated that lack of information sharing plan constrains information sharing both at farmers-traders and traders-AMF interfaces. The inconsistency of information systems constrains information sharing with farmers and the malt factory according to 73.0 and 79.7 percent trader-respondents respectively.

The median values of VCI indicators, except for commitment at farmers-traders interface, are low to indicate traders' disagreement with VCI statements at traders' interfaces.

Table 5: Median, IQR, Factor load and alpha scores (traders' survey)

Construct	Farmers		AMF	
	Mode (IQR)	**Factor loading**	**Median (IQR)**	**Factor loading**
Information Volume	(α = 0.769)		(α = 0.752)	
We provide varieties of information to chain partners	4.00(1.00)	0.842	4.00(1.00)	0.915
We receive varieties of information from chain partners	3.00(1.00)	0.821	4.00(1.00)	0.915
We provide detailed information to chain partners	3.00(1.00)	0.733	drop	drop
We receive detailed information from chain partners	drop	drop	drop	drop
Information quality	(α = 0.909)		(α =0.779)	
We provide timely information to chain partners	4.00(1.00)	0.827	3.00(1.00)	0.724
We receive timely information from chain partners	4.00(2.00)	0.801	3.00(1.00)	0.623
We provide correct information to chain partners	4.00(1.00)	0.703	4.00(1.00)	0.745
We receive correct information from chain partners	3.00(1.00)	0.730	drop	drop
We regularly visit chain partners to obtain firsthand information	3.00(1.00)	0.595	drop	drop
We are regularly visited by our partners for search of firsthand information	3.00(2.00)	0.743	4.00(1.00)	0.856
We provide information supporting decisions of chain partners	4.00(1.00)	0.927	4.00(1.00)	0.853
Information received from chain partners supports our decisions	4.00(1.00)	0.738	4.00(1.00)	0.623
Communication channels use	(α = 0.671)		(α = 0.697)	
We share information with chain partners face-to-face	3.00(2.00)	0.741	2.00(1.00)	0.808
We share information with chain partners through phones	2.00(1.00)	0.826	3.00(2.00)	0.862
We share information with chain partners during formal meetings	1.00(1.00)	0.693	2.00(1.00)	0.718
We share information with chain partners while at social events	2.00(1.00)	0.615	drop	drop
Value chain integration	(α = 0.881)		(α = 0.760)	
We and chain partners collaborate as if we are parts of a single firm	3.00(1.00)	0.852	2.50(1.00)	0.847
We and chain partners coordinate our activities end-to-end	2.50(1.50)	0.831	3.00(1.50)	0.898
We and chain partners are committed towards long-term relationships	4.00(1.00)	0.872	2.50(1.00)	0.855
We and chain partners jointly decide on critical operational and strategic issues	3.00(2.00)	0.830	2.50(1.00)	0.851

3.4.2. Regression analysis

As mentioned under data analysis section, we employed ordered logistics regression technique to test our hypotheses at cooperatives-farmers, farmers-traders, and traders-AMF interfaces. The types of relationships (i.e. positive, negative, neutral) between the information sharing variables and VCI are investigated. Separate ordered logistics regression tables were presented at each interface. Farmers' survey data were used to test hypotheses at farmers' interfaces and traders' survey data were used at traders' interfaces. Regression

model fit parameters, coefficients, and significance levels are presented in the Tables 6 and 9 followed by brief discussions of the results.

The results of the regression analysis based on farmers' survey show that information volume (H1), information quality (H2) and communication channels use (H3) are positively correlated with VCI at cooperatives-farmers interface. The finding on information quality coincides with the finding of the study by Wiengarten et al. (2010) where positive association was noted between information quality and VCI. The marginal effects reported in Table 6 show that an improvement of the ratings of information quality indicators by one unit from "neutral" to "agree" would increase the chance that the ratings of VCI indicators make the same improvement by 16.60 percent.

Table 6: Ordered logit regression results at cooperatives-farmers interface (farmers' survey)

Ordered logit regression				**Number of obs** = **320**		
				LR χ^2 (3) = **204.34**		
				Prob > χ^2 = **0.0000**		
Log likelihood = -268.76144				**Pseudo R^2** = **0.2754**		
				Marginal effects on VCI		
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Information volume	0.775**	-0.002	-0.136**	0.046*	0.092**	0.001
Information quality	1.392**	-0.004*	-0.244**	0.082*	0.166**	0.001
Communication channels use	0.354**	-0.001	-0.062**	0.021*	0.042**	0.000
		Standard errors			*95% Conf. Interval*	
/cut1	1.221	0.608			0.029	2.412
/cut2	5.822	0.566			4.713	6.931
/cut3	8.836	0.714			7.436	10.236
/cut4	14.106	1.265			11.627	16.586

Significant at:
** $p < 0.01$
* $P < 0.05$
VCI, Value chain integration

At farmers-traders interface, information volume (H1), information quality (H2) and communication channels use (H3) are positively related to VCI based on farmers' survey, see Table 7. Information quality makes strong influence on VCI as it can be seen from the marginal effects of this variable on VCI. For instance, when the ratings of information quality indicators improve by one unit, say, from "disagree" to "neutral", the chance that the ratings of VCI indicators make the same leap would increase by 33.5 percent. This shows the importance of information quality in improving the strength of VCI. Likewise, similar

improvement in the ratings of communication channels use indicators would increase the chance that ratings of VCI indicators makes the same jump by 10.5 percent.

Table 7: Ordered logit regression results at farmers-traders interface (farmers' survey)

Ordered regression				**Number of obs** = **320**		
				LR χ^2 (3) = **240.83**		
				Prob > χ^2 = **0.0000**		
Log likelihood = -236.79731				**Pseudo R^2** = **0.3371**		
				Marginal effects on VCI		
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Information volume	1.064**	-0.017**	-0.233**	0.235**	0.016**	0.000
Information quality	1.521**	-0.024**	-0.333**	0.335**	0.022**	0.000
Communication channels use	0.477**	-0.008*	-0.105**	0.105**	0.007**	0.000
		Standard errors			*95% Conf. Interval*	
/cut1	3.440	0.491			2.477	4.403
/cut2	8.054	0.677			6.727	9.381
/cut3	11.749	0.875			10.033	13.464

Significant at:
** $p < 0.01$
*$P < 0.05$
VCI, Value chain integration

At traders-farmers interface, information volume (H1) demonstrates no significant positive influence on VCI based on traders' survey, see Table 8. Whereas, a positive relationship was noted between information quality (H2) and VCI at the same interface. The same case was reported by Daft and Lengel (1986) that information quality positively relates to VCI. When the ratings to information quality indicators improve by one unit from "neutral" to "agree", the chance that the ratings of VCI indicators would make the same jump increases by 18.2 percent. Communication channels use failed to demonstrate significant positive influence on VCI at farmers-traders interface based on traders' survey.

Table 8: Ordered logit regression results at farmers-traders interface (Traders' survey)

Ordered logit regression			**Number of obs** = **100.00**			
			LR χ^2 (3) = **25.71**			
			Prob > χ^2 = **0.0000**			
Log likelihood = -91.240457			**Pseudo R^2** = **0.1235**			
			Marginal effects on VCI			
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Information volume	0.443	0.000	-0.053	-0.018	0.074	0.000
Information quality	1.080**	0.000	-0.129**	-0.045	0.182**	0.000
Communication channels use	0.033	0.000	-0.004	-0.001	0.006	0.000
		Standard errors			*95% Conf. Interval*	
/cut1	3.246	1.052			1.184	5.307
/cut2	3.327	1.054			1.262	5.393
/cut3	6.369	1.242			3.935	8.803

Significant at:
** $p < 0.01$
VCI, Value chain integration

Information volume (H1) has a significant positive influence on VCI at traders-malt factory interface, see Table 9. When the ratings of information volume indicators increase by one unit from "disagree" to "neutral", the chance that the rating of VCI indicators make the same improvement increases by 28.1 percent. Information quality and communication channels use failed to demonstrated significant positive relationship with VCI at the same interface. In the view of interviewed malt factory managers, the factory has no slight trust in traders for they destroy malt barley quality through adulteration and wishes to avoid any transactions with them. Narasimhan and Nair (2005) state similar case where lack of trust to share information with other value chain members weakens VCI.

Table 9: Ordered logit regression results at traders-malt factory (T-AMF) interface

Ordered logit regression				**Number of obs**	**= 100**
				LR χ^2 (3)	**= 20.21**
				Prob > χ^2	**= 0.0000**
Log likelihood = -75.780432				**Pseudo R^2**	**= 0.1180**
			Marginal effects on VCI		
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Information volume	1.188**	-0.0134	-0.283**	0.281**	0.016	0.000
Information quality	-0.123	0.001	0.029	-0.029	-0.002	0.000
Communication channels use	0.260	-0.003	-0.062	0.061	0.003	0.000
		Standard errors			*95% Conf. Interval*	
/cut1	-0.102	1.243			-2.538	2.334
/cut2	4.286	1.224			1.887	6.684
/cut3	8.649	1.513			5.683	11.614

Significant at:
** $p < 0.01$
VCI, Value chain integration

3.5. Conclusions and practical implications

The study in this chapter provides empirical evidences on critical metrics of information sharing such as *information volume*, *information quality* and *channels use* that the literature lacks, mostly in the context of agribusiness value chains in developing countries. It also investigated how these metrics of information sharing influence VCI at several interfaces in the MBVC in Ethiopia. The study showed that inconsistent information systems, lack of awareness about the importance of information sharing, absence of information sharing plans and low level of trust to share information are the most critical barriers to information sharing at those studied interfaces.

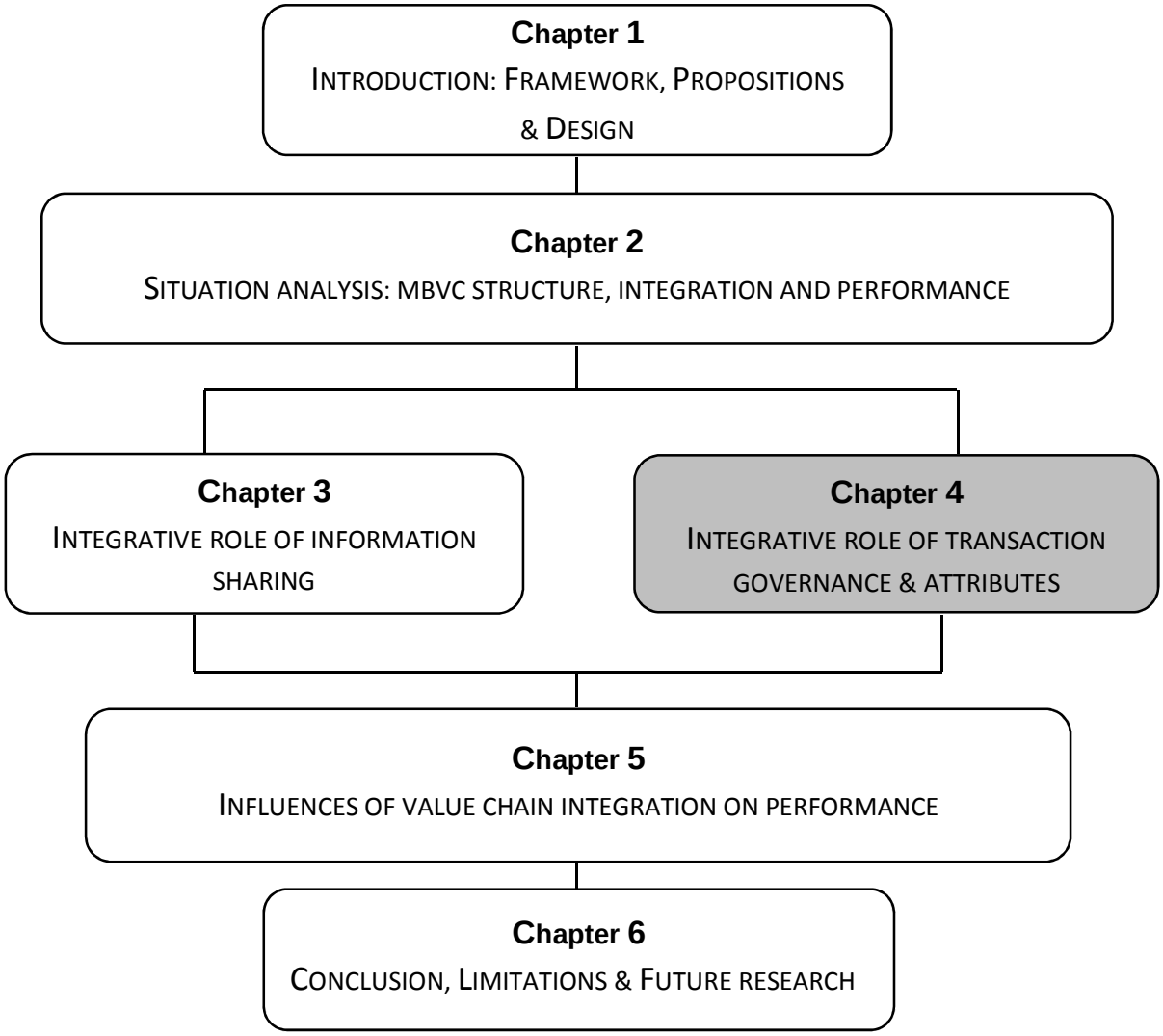
The multi-dimensional metrics of information sharing provide useful managerial insights on information sharing variables and their interplays with VCI. Those identified barriers to information sharing should be removed to improve the strength of VCI. For instance, farmers and their chain partners could benefit by harmonizing information sharing. Since farmers would like to share information during informal social gathering, their value chain partners should utilize this channel to expedite information flows.

Information sharing between traders and their value chain partners is highly constrained by lack of trust caused by traders' opportunistic behavior which kills the desire to share

information. Traders usually block price information released by the malt factory from reaching the farmers to weaken farmers' negotiation power on price and other terms of exchange. Farmers and the malt factory are also not kin to share information with traders whom they characterize as opportunists. As long as traders are the key players in the aggregation and supply of malt barley to the malt factory, their integration to the chain through proper flow of information between them and other value chain members needs to be given special attention. Alternatively, the malt factory and its collaborators could improve the flow of information with farmers and cooperatives with an ultimate goal of convincing farmers to supply directly to the malt factory or through cooperatives.

Since information sharing metrics have predominant influence on VCI, MBVC members and policymakers should work towards the inclusion of these metrics in their information sharing plans and policies. Value chain members should also be given trainings on concepts of information sharing and on the importance of information sharing in promoting value chain thinking, strengthening value chain integration and improving value chain performance.

The use of empirical data obtained from a single malt barley value chain in Ethiopia would limit the generalizability of the findings, therefore, future study should include more chains for robust and better generalizable findings.


Chapter 1
INTRODUCTION: FRAMEWORK, PROPOSITIONS & DESIGN
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SITUATION ANALYSIS: MBVC STRUCTURE, INTEGRATION AND PERFORMANCE
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Chapter 4

The Integrative Role of Value Chain Governance

The chapter is based on:

Watabaji, M. D., Molnár, A., Gellynck, X. (2016). The integrative role of value chain governance: Evidences from the malt barley value chain in Ethiopia. *Journal of Institute of Brewing: In press*

Watabaji, D. M., Molnár, A., and Gellynck, X. (2015, 23-24 September). Value chain governance and its influence on integration: Evidences from the malt barley value chain in Ethiopia, International Conference of Agriculture for Development, Uppsala, Sweden.

4. The Integrative role of value chain governance

4.1. Introduction and objectives

The MBVC, alike other agribusiness value chains (Bijman, 2002; Zhang and Aramyan, 2009), involves several members and covers many interfaces from the supply of inputs for malt barley farming down through the delivery of beer to the final consumers. The governance of transactions along such a value chain has attracted researchers' interests. VCG deals with administration of series of interconnections among several value chain members whose primary tasks are to procure or transform or use resources to produce and/or delivery valuable goods and/or services to immediate customers and then to final consumers (Pilbeam et al., 2012).

It is obvious that value chains operate to create the most of value, not simply for a single or few but for entire members in the value chain (Chan et al., 2003). In this context, effective VCG mechanisms help value chain members to identify activities that can be performed in-house and those that should be outsourced to other chain members (Gereffi et al., 2005). In the context of value chain, VCG refers to power distribution dynamics between value chain members with which plans and actions of other chain members are influenced and controlled (Johnston and Meyer, 2008); a framework of relationships among value chain members (Crișan et al., 2011); and a way of organizing transactions (Menard, 2006).

Extant theories proposed alternative VCG mechanisms that can improve collaboration among value chain members and coordination of activities along the value chain interfaces which lead to higher value chain performance (Wathne and Heide, 2004; Gereffi et al., 2005). The study by Zhang and Aramyan (2009) and Ferguson et al. (2005) conceptualize VCG mechanisms to take either a contractual or a relational mechanism or their combinations. Past studies emphasized on contractual mechanism while relational mechanism received less attention irrespective of its importance, mostly for value chains in developing countries though social relations play key roles in these countries.

In the view of some scholars, VCG mechanisms are not universally and equally suitable, rather the particularities of chains' contexts and transactions attributes would determine their choice

(Fischer et al., 2008; Molnár, 2010). The particularities of the country of operation and the prevalence of transaction attributes always determine the choice of effective VCG mechanism (Williamson, 1991; Porter and Phillips-Howard, 1997; Molnár, 2010). Interactions dynamism creates big challenges (Gellynck and Molnár, 2009), and these challenges can be tackled through the use of effective VCG mechanism (Grandori, 1997). In the view of Porter and Phillips-Howard (1997), agribusiness value chains governance was not fully explored and studies that investigate the relationship between VCG and VCI constructs are highly relevant.

As an outcome of effective value chain management, VCI still lacks standardized definition, rather differently understood by different people in different settings (Richey et al., 2010; Crișan et al., 2011). For instance, (Vaart and Donk, 2008) defined VCI as an average numbers of interactions between value chain members within the given time period. Bagchi et al.(2005) defined it as a management of product, service, financial, information flows to provide superior of values to end users. In this chapter, VCI is defined using four conceptual manifests, termed as constructs. These are: collaboration among value chain members by way of pooling resources, capabilities and risks for survival (Narasimhan and Nair, 2005; Menard, 2006), commitment of value chain members towards long-term relationships (Morgan and Hunt, 1994), coordination of activities along the value chain interfaces (Simatupang et al., 2002), and joint decisions making on important operational and strategic issues (Malhotra et al., 2005). In the view of many researchers, strong VCI leads to higher performance outcomes both at individual member- and value chain-levels (Narayanan and Raman, 2002; Pagell, 2004; Rajaguru and Matanda, 2009; Villena et al., 2009; Richey et al., 2010).

Past studies devoted more efforts to investigate how VCG is associated with VCP than its association with VCI (Richey et al., 2010). Moreover, much emphasis was given to political and corporate governances than to VCG (Crișan et al., 2011). Zhang and Aramyan (2009) formulated a framework for agro-processing value chains governance and called for its empirical underpinning. Therefore, the study presented in this chapter is a timely response.

The specific objectives of the study presented in this chapter are to: (1) explore transactions governance and attributes at various interfaces of the MBVC, (2) select key constructs and

indicators of these constructs, and (3) investigate how VCG mechanisms and transaction attributes correlate with VCI. The achievement of these objectives would broaden VCG and VCI concepts in particular and value chain management theories in general. The findings provide evidence-based inputs for policy making in relation to MBVC governance and integration.

The chapter is structured as follows. In the next section, we formulate the research framework and hypotheses. Then, the research methodology is described which is followed by results and discussions. The final section provides the conclusions and practical implications of the study.

4.2. Theoretical background and conceptual framework

4.2.1. The concepts of value chain governance and integration

Although different factors could influence VCI, there is consensus among researchers that value chain governance mechanisms and transaction attributes are the most important ones. Given their wider applicability, institutional economics and economics of organization theories, particularly, transaction cost economics theory lay down a theoretical blueprint for the conceptual framework of this study (Williamson, 1991; Zhang and Aramyan, 2009; Ebers and Oerlemans, 2013). Value chain governance mechanisms refer to contractual and relational frameworks used to establish exchange transactions between value chain members (Zhang and Aramyan, 2009). In the view of Williamson (1991), value chain governance mechanisms lie on a continuum connecting two extreme ends. At one of the ends is the spot-market where prices are the bases to establish exchange transactions, while at the other end lies the hierarchy which in-house exchange transaction under a single-ownership. In between, there exist various hybrid forms of value chain governance styles, such as specification contracts, strategic alliances, joint ventures, and quasi-integration (Ebers and Oerlemans, 2013).

Most past studies on value chain governance focus mainly on contractual mechanism that is used to monitor exchange transactions (Zhang and Aramyan, 2009). Within the framework of transaction cost analysis (TCA), exchange transactions should be well organized to reduce transaction costs (Williamson, 1973). However, TCA is criticized for its simplicity and for failing to consider relational mechanism to organize exchange transactions (Demsetz, 1988; Ring and

Van de Ven, 1994). In the view of Bijman et al. (2010), relational mechanism is featured mainly through the trust a given value chain member has on its chain partners. Therefore, in this study trust is considered as a proxy variable to represent relational mechanism.

Based on TCE theory, transaction attributes (i.e. the frequency of exchange transactions, the specificity of assets and the degree of uncertainty) would influence the choice of value chain governance structure (Slangen et al., 2008; Zhang and Aramyan, 2009). The personal characters of value chain members (i.e. bounded rationality and opportunistic behavior) are also important inputs while choosing from among available value chain governance mechanisms (Slangen et al., 2008). In this study, bounded rationality and opportunism are taken care of either through contractual or relational mechanisms (Molina-Morales and Martínez-Fernández, 2009). In the view of Williamson (1985), the choice of value chain governance mechanism is a key to improve coordination of activities and decisions, collaboration among members and commitment towards long-term relationships.

Past studies have indicated that transaction attributes would influence the choice of value chain governance mechanism, while the relationships between these attributes and VCI were not fully studied. For instance, contractual mechanism is suitable when asset specificity and/or uncertainty in the exchange environment are low (Dyer, 1996). When each or both of them are high, a single-ownership (i.e. hierarchical) structure reduces opportunism of value chain members and hence boosts VCI (Zhang and Aramyan, 2009). Based on the above theoretical background, Figure 9 depicts the conceptual framework to guide hypotheses formulation, results and discussion in this study.

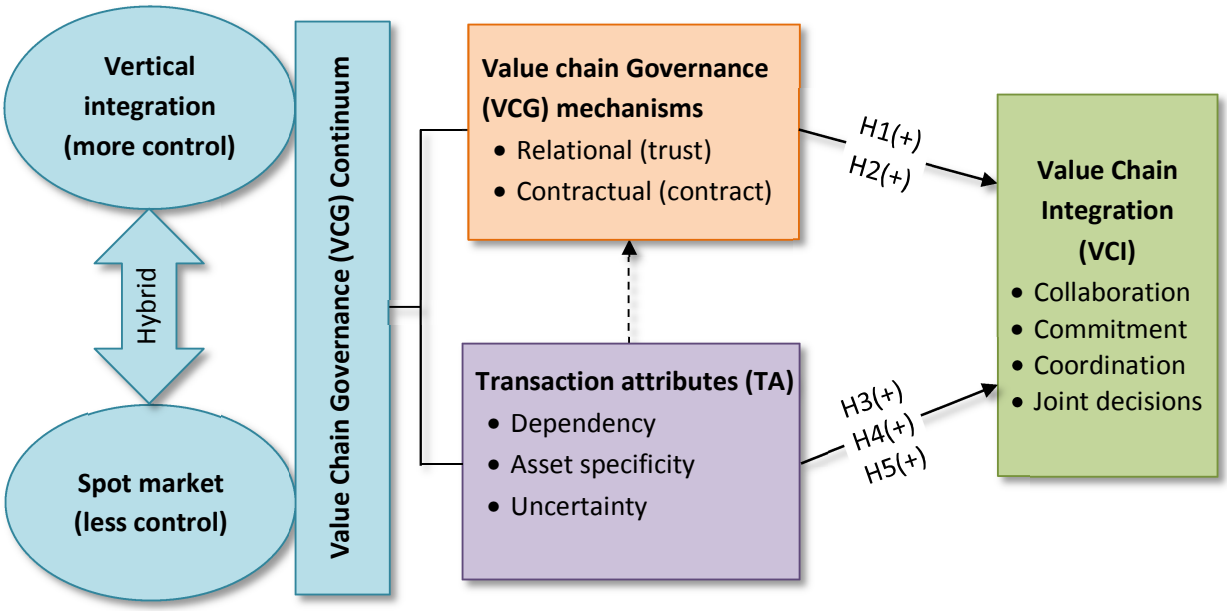


Figure 9: Conceptual framework linking transaction governance and attributes to VCI
Source: Own formulation based on Zhang and Aramyan (2009)
Note: Relationship shown by broken arrow is not the focus of this study; H_1-H_5, hypotheses 1-5

4.2.2. Research hypotheses

Based on the conceptual framework, we proposed the following research hypotheses for investigation.

Relational mechanism

Relational mechanism, with trust as its major pillar, capitalizes on existing relationship among value chain members. Value chain members are expected to perform better when they establish strong relationship with other value chain members (Ferguson et al., 2005). In social psychology and marketing literature, trust is understood as a perceived credibility and benevolence of value chain members about value chain partners (Geyskens et al., 1998). Trust measures the reliability of value chain partners and the level of confidence in their capacity to deliver what they promised (Ganesan, 1994; Bastl et al., 2012). When value chain members build trust, transaction costs are minimized as agreements can easily be reached on important exchange terms (Zhang and Aramyan, 2009). On the other hand, high level of trust could lead to high level of risk from opportunism, loss of commitment, and ultimately weak VCI (Villena et al.,

2011). In the view of (Kwon and Suh, 2004) when the level of trust low, much efforts of value chain members are required to execute exchange transactions. Based on these premises, the following hypothesis is proposed.

Hypothesis 1: *The level of trust in value chain partners positively relates to VCI.*

Contractual mechanism

In this study, contractual mechanism is described as the degree to which contracts are used to establish transactions (Ferguson et al., 2005). Many researchers encourage the use of contracts in developing countries (Glover, 1987; Porter and Phillips-Howard, 1997) to improve agribusiness the integration of value chains so as reduce transaction costs (Zhang and Aramyan, 2009). Contract is a legal instrument that bonds value chain members together by specifying duties and responsibilities of the members (Bastl et al., 2012). It also helps value chain members to concur potential risks and uncertainty in exchange environment (Wathne and Heide, 2004; Ferguson et al., 2005; Arshinder and Deshmukh, 2008).

Contractual mechanism is also a response to several imperfections around exchange relationships that would be caused by power imbalances, information asymmetry, and members' opportunism (Key and Runsten, 1999). Contractual mechanism is suitable for downstream food and beverage processors in agribusiness value chains as it allows participation and promote control of the production processes without owning the lands. Contract is acknowledged for its vital role in linking small-scale farmers to large food and beverage processors. In view of Glover (1987), contractual mechanism is used in agribusiness value chain to set quantity, prices and quality specifications prior to planting periods to ensure delivery as per the specifications. In most case, contractual mechanism in agribusiness value chains contain terms that oblige downstream food and beverage processors to provide farmers with credits, inputs, farm tools rentals, technical advices and attractive prices to incapacitate these farmers so as to meet the required standards (Gwynne, 2006). Even if food and beverage processors cannot provide these facilities themselves, they can still negotiate with other third party providers.

Though contract promises several benefits to value chain members, strict adherence may also weaken agribusiness VCI (Ferguson et al., 2005). When contract is taken as a complete remedy without well-developed social relations, VCI may suffers (Cannon et al., 2000) for there are non-contractible aspects of exchange transaction (Menard, 2006). There are contradicting views regarding benefits of contract signed between parties with substantial power differences. Contract may fail to improve VCI when large food and beverage processors with monopsony and/or monopoly power override the interests of small-scale farmers to meet their short-term profit motives (Glover, 1987; Ferguson et al., 2005). In the view of Arshinder and Deshmukh (2008), contractual mechanism promote VCI, if terms of the contract take the interests of both parties in to account. From these perspectives, the following hypothesis is forwarded.

Hypothesis 2: *The use of contracts to organize exchange transactions in the value chain positively relates to VCI.*

Dependency

Value chain members are interdependent as single member cannot possess and/or control all necessary resources and/or capabilities to produce and deliver the desired outputs (Mikkola, 2008; Vanpoucke, 2009). According to the resource based view (RBV), the interdependency of value chain members on their value chain partners caused by the need to access valuable resources of other chain members to overcome the absence/inadequacy of these resources. The degree of dependency of value chain members on their value chain partners motivates chain members to engage in a successful and mutually beneficial exchange transactions (Kambewa, 2007). A highly dependent value chain member is always punctual to collaborate with value chain partners. When dependency is high, marginalized value chain members can obtain the right to access valuable resources through VCI.

In agribusiness value chains, cooperatives could act as a conduit between farmers and large food and beverage processors to carry out transactions, since such associations can easily mediate by defusing power imbalances between small-scale farmers and large food and beverage processors (Porter and Phillips-Howard, 1997). In the MBVC, cooperative

organizations however are weak and could not build sufficient market power for the farmers vis-à-vis large malt factory and breweries. Moreover, they are engaged more in the provision of agricultural inputs than on the marketing of malt barley.

The AMF, a single malting plant in the study area, is a monopsony in the malt barley market and a monopoly in the malt market. The factory possesses tremendous power and can influence other chain members. According to past studies, high dependency of value chain members on their value chain partners leads to strong VCI (Danese et al., 2004; Wu et al., 2004). Hence, the following relationship is proposed.

Hypothesis 3: *The degree of dependency of a value chain member on their value chain partners positively relate to VCI.*

Asset specificity

Asset specificity focuses on the accumulation of assets that are costly or difficult to mobilize from one value chain for use in another value chains. It has been defined as value of durable investments that are made to support a particular purpose and be lost if used for any other alternatives (Williamson, 1985; Bijman, 2002; Menard, 2006; Zhang and Aramyan, 2009). In the views of Williamson (1985) and Bijman (2002), there are five types of asset specificities. These are: *site specificity* which emanates from the particularity chain members' location; *physical specificity* which results from investment in peculiar equipment and tools; *human specificity* which results from investment in specific knowledge creation; *dedicated specificity* which results from investment in generic assets specific to particular transactions; and *brand specificity* which emanates from investment in brand building.

In the view of Cai et al. (2009), investments made to build particular relationship with value chain partners is a specific asset which becomes sunk cost when the relationship breaks. Assets specificity influences the choice of value chain governance mechanism (Bijman, 2002) and the need to utilize such assets bonds value chain member together (Menard, 2006). In the view of Kim (2009), for instance, asset specificity leads to stronger VCI. Based on this view, the following hypothesis is proposed.

Hypothesis 4: *The specificity of the assets owned by value chain members positively relates to VCI.*

Uncertainty

Uncertainty refers to variations between value chain members' expectations and the actual occurrences (Dan De Vost et al., 1998). In the view of Bijman (2002), there are three types of uncertainties in relation to exchange transaction. The *first* one is a change in value chain environment that causes turbulence in the exchange situation; the *second* is a change in value chain members' behaviors; and the *third* is a complexity of the exchange transaction itself. In the view of Zhou and Benton Jr (2007), uncertainty refers to the unpredictability of supplies, processes, and demands in terms of quantity, quality, delivery time, and seasonal patterns caused by inherent and administrative processes. The RBV stipulates the use of effective value chain governance mechanism to reduce the risks of uncertainty (Cai et al., 2009). Uncertainty could emanate from own deficiency or chain partners' behavior or the state of nature (Menard, 2006). It is always difficult, in practice, to develop all technical and managerial capabilities in-house to deal with all types of uncertainties around exchange transactions (Gereffi et al., 2005), unless otherwise value chain members integrate. Value chain members can have access to the missing capabilities as long as it is available with other value chain members if VCI is strong (Mikkola, 2008).

In an instability exchange situation, effective value chain governance mechanism can be considered as a tool to manage all possible operational turbulences (Zhang and Aramyan, 2009). In view of Geyskens et al. (1998), uncertainty is grouped into (1) environmental diversity which refers to the degree of heterogeneity and complexity of exchange environment, (2) environmental volatility which refers to the rapidity of changes in the exchange environment, and (3) environmental munificence which refers to the degree of resources abundance or scarcity. In uncertain exchange situation, value chain members cannot meet their chain partners' needs (Van Der Vorst, 2000) and it calls for VCI (Zhou and Benton Jr, 2007).

In the view of Menard (2006), uncertainty outgrows from uncoordinated activities, inflexibility to adapt to changes, and difficulty to control process flows. There are few empirical studies to establish a positive relationship between uncertainty and VCI (Childerhouse and Towill, 2003; Donk et al., 2008). Since uncertainty is inherent and inevitable, Dan De Vost et al. (1998) encourage value chain members to collaborate at least to share consequential risks. Based on the above premises, the following interplay is proposed.

Hypothesis 5: *The degree of uncertainty in the exchange environment positively relates to VCI.*

4.3. Research methodology

A multi-step research approach was employed to gain insights on VCG mechanisms and transaction attributes and their association to VCI in the MBVC contexts. Several indicators of VCG mechanisms and transaction attributes were identified from the literature. Similarly, key conceptual indicators for VCI were identified.

4.3.1. Scope and sampling

Similar to studies presented in the previous chapters, our sample domain consists of members of the MBVC in Ethiopia. For the field survey, sample farmers and traders were drawn from four selected districts of Arsi and West Arsi administrative zones. These districts were selected for their wide malt barley coverage and high production of marketable surplus malt barley (Legesse et al., 2007; Kassahun, 2011). Key informants for interviews were identified from among farmers, traders, cooperatives staff, and managers at AMF, the only malt plant in the study area.

As explained under section 1.4 of chapter one, survey data were collected from a sample of 320 farmers and 100 traders selected from four districts, our study area, see Table 3 for respondents' profile. In addition to survey data, qualitative interview responses were compiled from 62 key informants of which 27 were farmers, 13 were traders, 17 were cooperatives staff, and 5 were managers at AMF. For all interviews, key informants were selected for being more knowledgeable on issues related to information sharing constructs and their influence on the

MBVC integration (Li and Lin, 2006; Vanpoucke, 2009). Both survey data and qualitative interview responses were used to explore VCG structure and transaction attributes and to analyze the association between these constructs and VCI at cooperatives-farmers, farmers-traders, and traders-malt factory interfaces.

4.3.2. Measurement scale and validation

In this study, we asked respondents (i.e. farmers, cooperatives staff, traders, managers of the malt factory) to measure the level of use of relational governance structure (trust), contractual governance structure (contract) , and the prevalence of each transaction attribute, all of which are explanatory variables, by expressing the extent of their agreement on 23 indicators identified for this purpose. These indicators were identified from past studies (Akkermans et al., 1999; Fawcett and Magnan, 2001; Simatupang and Sridharan, 2002; Sheu et al., 2006; Leat and Revoredo-Giha, 2008; Vaart and Donk, 2008; Kim, 2009; Awad and Nassar, 2010; Cao and Zhang, 2010; Prajogo and Olhager, 2012). Specific to the context of this study, VCG mechanism include: 1) trust, a pillar of relational governance structure, and 2) contract, a tool used under contractual governance structure; and transaction attributes include: 1) asset specificity, 2) dependency of value chain members on their value chain partners, and 3) uncertainty in the exchange environment. During the field survey, respondents were asked to rate the level of their agreement with indicators comprising contractual and relational governance mechanisms, transaction attributes and VCI constructs on a five point Likert scale where “1” = “strongly disagree” and “5” = “strongly agree” (Pandey et al., 2010).

In the same way, we asked respondents to measure the strength of VCI, our outcome variable, by expressing the extent of their agreement on its 4 key constructs on a five-point Likert scale ranging from “1” for “strongly disagree” to “5” for “strongly agree”. The key constructs of VCI and their indicators were also identified from past studies (Akkermans et al., 1999; Fawcett and Magnan, 2001; Simatupang and Sridharan, 2002; Sheu et al., 2006; Leat and Revoredo-Giha, 2008; Vaart and Donk, 2008; Kim, 2009; Awad and Nassar, 2010; Prajogo and Olhager, 2012).

We employed the within scale exploratory factory analysis (EFA) to assess construct validity of each set of observable indicators of each latent variable in terms of explaining the multivariate latent variable they tend to explain (Lin et al., 2005; Zhou and Benton Jr, 2007; Sezen, 2008). While extracting the factor loads, we used the principal component method, un-rotated factors solution display, by fixing the number of factors to 1 for each latent variable, since observable measurement indicators under each latent variables were extracted from past studies. Accordingly, observable indicators that loaded lower than 0.50 were dropped from further analysis for insufficient validity (Narasimhan and Nair, 2005; Pandey et al., 2010), see Tables 10 and 11. Moreover, Cronbach's alpha reliability scores were used to check whether the internal consistencies of the multi-item latent variables are sufficient (Narasimhan and Nair, 2005; Zhou and Benton Jr, 2007; Pandey et al., 2010; Tessema, 2012). As explained by Patnayakuni et al. (2006), Cronbach's alpha scores measure the homogeneity of indicators under each construct. Accordingly, Cronbach's alpha reliability score greater than 0.60 is considered as a minimum threshold to maintain good internal consistency of the measurement indicators (Zhou and Benton Jr, 2007; Wu et al., 2014).

The average median values of our latent variables were computed from the median value of observable indicators identified for each latent variable from past studies (Li and Lin, 2006; Pandey et al., 2010). The four constructs of VCI, our dependent variable, are latent variables themselves and were measured by the average median values of the several observable indicators used as proxy measurements for these constructs/variables. These observable proxy indicators of VCI constructs were presented in the fifth chapter of this doctoral dissertation since each VCI construct was treated as explanatory variable for VCP, our outcome variable. These summated scales were used while running the ordered logistic regressions at the various MBVC interfaces.

4.3.3. Data analysis

Similar to what we did in the previous chapter, both descriptive statistics and ordered logistics regression were used for data analysis. Descriptive statistics such as percentages, median values and interquartile ranges (IQR) were used to measure the level of trust, extent of contract use,

the prevalence of transaction attributes, and the strength of VCI. Median and IQR values were used instead of mean and standard deviation values due to the ordinal nature of the data sets (Molnár, 2010). In case of ordinal data, mean values can indicate only the location of estimates not found within the range of five-point scales. The IQR is the difference between the 75^{th} and 25^{th} percentiles and hence, includes 50 percent of the values to ensure the negligibility of the influences of outliers. We used ordered logistic regression to test the proposed relationships between our five exogenous and a single endogenous variables.

In this study, all observable indicators were measured on five point ordinal scales and the "distance" between these five points are not believed to be equal due to low level of analytical capacity of respondents. For instance, the distance between "strongly disagree" and "disagree" may be narrower or wider than the distance between "agree' and "strongly agree". Moreover all significant cut-off points provided by the regression analysis are higher than 1 to show the interval between consecutive orders are not of equal size. The use of ordered logistic regression is the quite appropriate under such a condition. The ordered logit regression was run on Stata12 software at cooperatives-farmers, farmers-traders, and traders-malt factory interfaces using farmers' and traders' survey data.

Since ordered logit model is based on parallel regression assumption, we conducted the approximate likelihood-ratio test using Stata syntax, 'Omodel logit' to see if this assumption was fulfilled. The parallel regression assumption is said to be met when the *p*-values of the approximate likelihood-ratios are greater than 0.05. In our case, the *p*-values are 0.010 and 0.201 at cooperatives-farmers and farmers-traders interfaces respectively based on farmers' survey data and 0.407 and 0.267 at the farmers-traders and traders-malt factory interfaces respectively based on traders' survey data. These show that the parallel regression assumption was met at all studied interfaces, except between cooperative and farmers. Therefore, the ordered logit regression coefficients and the marginal effects of governance mechanisms and transaction attributes (i.e. our exogenous variables) on VCI (i.e. our endogenous variable) were generated to explain the association between these two sets of variables.

4.4. Results and discussions

In this section, important results of the descriptive and regression analyses were presented and discussed in line with our conceptual framework.

4.4.1. Descriptive statistics

In order to stay within the study scope, survey data and interview responses pertaining to the research framework and hypotheses were analyzed and discussed. Survey data collected from farmers and traders were treated separately to avoid possible distortion of results. For each latent variable, summated median values of observable indicators that are higher than the threshold were used (Li and Lin, 2006; Zhou and Benton Jr, 2007; Pandey et al., 2010). The median value, inter-quartile range and factor loading for each observable indicators of latent variables and Cronbach's alpha reliability scores for each latent variables at cooperatives-farmers, farmers-traders, and traders-malt factory interfaces were presented in Tables 10 and 11 along with brief discussions.

Table 10: Median, IQR, factor loading and α scores (farmers' survey)

	Coop. – farmers Interface		Farmers - Traders Interface	
***Construct*/indicator**	**Median (IQR)**	**Factory loading**	**Median (IQR)**	**Factor loading**
Trust level	*(α = 0.885)*		*(α = 0.903)*	
Chain partners keep their promise	3.00(2.00)	0.751	3.00(1.00)	0.723
Chain partners consider our success as theirs	3.00(2.00)	0.811	2.00(1.00)	0.814
Chain partners are honest to us	3.00(2.00)	0.727	2.00(2.00)	0.815
We are confident that our chain partners are competent	3.00(2.00)	0.798	2.00(1.00)	0.829
Chain partners comply with our working principles	2.00(1.00)	0.742	2.00(1.00)	0.790
Chain partners are ready to help us under any conditions	3.00(1.00)	0.787	2.00(2.00)	0.843
Chain partners do not decide against our interests	3.00(2.00)	0.776	2.00(1.75)	0.760
Contract use	*(α = 0.713)*		*(α = 0.785)*	
We and chain partners use contracts to better organize our transactions	2.00(1.00)	0.706	2.00(2.00)	0.792
We and chain partners reduced suspicion of cheating through use of contracts	3.00(2.00)	0.840	2.00(2.00)	0.867
We and chain partners implement our plans by using contracts	3.00(2.00)	0.845	3.00(2.00)	0.853
Dependency	*(α = 0.868)*		*(α = 0.803)*	
Our success depends on the actions of chain partners	4.00(2.00)	0.776	3.00(2.00)	0.728
It is difficult to replace chain partners	3.00(2.00)	0.810	2.00(1.00)	0.667
Disruptions of chain partners' operations disrupt ours	4.00(1.00)	0.752	3.00(2.00)	0.675
It is costly to lose chain partners	4.00(1.00)	0.869	3.00(2.00)	0.814
It is costly to switch from chain partners	3.00(2.00)	0.838	2.00(1.00)	0.758
Asset specificity	(α = 0.661)		(α = 0.628)	
Investment in facilities/tools is lost if chain partners change their products	2.00(2.00)	0.839	2.00(2.00)	0.875
Investment in human resources is lost if chain partners change their products	2.00(2.00)	0.931	2.00(2.00)	0.890
We invested heavily to strengthen our relation with chain partners	3.00(2.00)	0.879	2.00(1.00)	0.888
Our investment in relationships is lost if the relation breaks	3.00(2.00)	0.867	2.00(1.00)	0.870
Uncertainty	*(α = 0.660)*		*(α=0.627)*	
Policy of chain partners change frequently	3.00(1.00)	0.753	3.00(2.00)	0.762
Price offers/quotes of chain partners are difficult to predict	3.00(1.00)	0.765	3.00(2.00)	0.757
Technology used by chain partners change fiercely	3.00(1.00)	0.796	3.00(2.00)	0.751
Value chain integration	*(α = 0.881)*		*(α = 0.760)*	
We and chain partners collaborate like we are units of same entity	3.50(1.50)	0.857	2.50(1.00)	0.843
We and chain partners coordinate our activities	3.00(1.00)	0.877	2.00(1.00)	0.871
We and chain partners are committed towards long term relationships	3.00(1.50)	0.874	2.50(1.00)	0.866
We and chain partners jointly decide on operational and strategic issues	2.50(1.00)	0.841	2.00(1.00)	0.888

As it can be seen from Table 10, median values of all observable indicators of trust except one are low at farmers-traders interface to show farmers' disagreement with these indicators at that particular interface implying low level of trust. Interviewed farmers also explained that they do not trust traders due to their extreme opportunism. In these farmers' views, traders always

collude to lower malt barley price, mix superior quality with poor quality, and also manipulate the weight of malt barley by adjusting the measurement scale to fulfill their short-term profit motives.

Farmers' survey data show high dependency of farmers on cooperative since median values of observable indicators of dependency at cooperatives-farmers interface are relatively high. Interviewed farmers also expressed that their success in the chain depends on supply of improved seeds and other agriculture inputs by cooperatives. These agricultural inputs are the limiting factors that determine the productivity of malt barley.

In the MBVC, the use of formal contract is a recent practice at farmers' interfaces though informal contracts were practice since long ago to establish transactions. Contract farming was initially introduced to malt barley farmers by ESE in collaboration with cooperatives in *Digelu* and *Lemu-Bilbilo* districts few years ago. Recently, Heineken N.V., the multinational brewery, has launched pilot contact farming with 4,500 farmers through its Community Revenue Enhancement through Agricultural Technology Extension (CREATE) project to boost malt barley productivity to meet its local sourcing target of 60 percent by 2020. Meta-Diageo, another multinational brewery, has also started contract farming with 6,000 farmers as a trial package with expansion intention if good results are obtained. Though contract farming is commonly used by food and beverage processers elsewhere (Glover, 1987), the Assela malt factory did not implement it yet. The factory has a plan to start with few cooperatives and farmers as pilot project and scale it up if good results are obtained from the pilot project.

The introduction of contract farming in the MBVC has made important agricultural inputs and other technical services accessible to the contracting farmers. Moreover, farmers in the contracts have generated relatively higher income due to improved productivity, quality and premium contract prices. On the other hand, farmers have failed to follow the strict agronomic and crop management practices stipulated in the contracts. Though it is too early to talk about success stories, promising preliminary results were obtained. In the view of the coordinator of the CREATE project, for instance, farmers in contract farming have doubled, even tripled in few cases, malt barley productivity and thereby farmers' income.

The initiators of contract farming noted that some farmers violate contract terms due to problems of moral hazard and adverse selection. The most common moral hazard problems are: (1) farmers in contract farming perform side selling to traders for meager benefits, (2) farmers in contract farming sell malt barley of other farmers along with theirs to share from premium prices that the contract offers, and (3) these farmers are less committed to meet the terms of the contracts. Adverse selection is also a serious problem as farmers or cooperatives conceal facts to proof that they are capable to fulfill the contractual requirements. Some farmers expressed that contract prices are fixed based on average market prices taken at time of harvest and market prices are normally lower during this peak supply period.

The low median values of asset specificity indicators at farmers' interfaces reveal that farmers' assets are not so specific. These assets, both tangibles such as land, farm animals and tools and intangible assets such as farming experiential knowledge and established social relations with chain partners can be used for the production and marketing of alternative crops. However, farm lands at the extreme highlands of the study area are suitable more for barley production than any other crops which somehow indicates the specificity of this asset. Since such farmlands constitute a very small portion of areas suitable for barley production, the overall assessment shows less specificity of this assets.

Except coordination of activities at cooperatives-farmers interface, all median values of VCI indicators are low to show weak VCI at both cooperatives-farmers and farmers-traders interfaces. Interviewed farmers and cooperative staff expressed that their purchasing, operation, and logistic activities are well coordinated since these activities are jointly planned.

Table 11: Median, IQR, factor loading and α scores (traders' survey)

***Construct*/indicator**	**Farmers- traders interface**		**Traders-AMF interface**	
	Median (IQR)	**Factor loading**	**Median (IQR)**	**Factor loading**
Trust level	*(α = 0.887)*		*(α = 0.859)*	
Chain partners keep their promise.	3.00(1.00)	0.870	4.00(1.00)	0.740
Chain partners consider our success as theirs	4.00(1.00)	0.846	4.00(1.00)	0.756
Chain partners are honest to us.	3.00(1.00)	0.846	4.00(1.00)	0.849
We are confident that our chain partners are competent.	4.00(1.00)	0.818	4.00(1.00)	0.803
Chain partners follow our working principles.	3.00(1.00)	0.673	3.00(2.00)	0.741
Chain partners are ready to help us under any conditions.	3.00(2.00)	0.643	3.00(2.00)	0.715
Chain partners do not decide against our interest.	3.00(1.00)	0.706	4.00(1.00)	0.550
Contract	*(α = 0.873)*		*(α = 0.873)*	
We and chain partners use contracts to better organize our transactions	2.00(1.75)	0.879	2.00(2.00)	0.880
We and chain partners reduced suspension of cheating through use of contracts	2.00(1.00)	0.897	2.00(1.00)	0.897
We and chain partners implement our plans by using contracts	2.00(3.00)	0.912	2.00(3.00)	0.905
Dependency	*(α = 0.760)*		*(α = 0.842)*	
Our success depends on the actions of chain partners	4.00(1.00)	0.614	4.00(1.00)	0.690
It is difficult to replace chain partners	4.00(1.00)	0.731	4.00(1.00)	0.827
Disruptions of chain partners' operations disrupt ours	4.00(1.00)	0.656	4.00(1.00)	0.712
It is costly to lose chain partners.	4.00(1.00)	0.860	4.00(1.00)	0.877
It is costly to switch from chain partners	4.00(1.00)	0.717	4.00(1.00)	0.806
Asset specificity	*(α=0.902)*		*(α=0.792)*	
Investment in facilities/tools is lost if chain partners change their products	4.00(1.00)	0.839	4.00(1.00)	0.875
Investment in human resources is lost if chain partners change their products	3.00(2.00)	0.931	4.00(2.00)	0.890
We invested heavily to strengthen our relation with chain partners	4.00(2.00)	0.879	3.00(3.00)	0.888
Our investment in relation-building is lost if the relation breaks	4.00(2.00)	0.867	4.00(2.00)	0.870
Uncertainty	*(α=0.792)*		*(α = 0.573)*	
Policy of chain partners change frequently	3.00(2.00)	0.831	4.00(0.75)	0.796
Price offers/quotes of chain partners are difficult to predict	3.00(2.00)	0.826	4.00(1.00)	0.709
Technology used by chain partners change fiercely	3.00(2.00)	0.865	4.00(1.00)	0.729
Value chain integration	*(α = 0.866)*		*(α = 0.884)*	
We and chain partners collaborate like we are units of same entity	3.00(1.00)	0.852	2.50(1.00)	0.847
We and chain partners coordinate our activities	2.50(1.50)	0.831	3.00(1.50)	0.898
We and chain partners are committed towards long term relationships	4.00(1.00)	0.872	2.50(1.00)	0.855
We and chain partners jointly decide on operational and strategic issues	3.00(2.00)	0.830	2.50(1.00)	0.851

Contrary to farmers' perceptions, traders agreed with indicators of trust at their interfaces both with farmers and the malt factory and the median values are relatively higher. Interviewed traders also expressed to have more trust in farmers than in the malt factory. Therefore, traders rarely use contracts to establish transactions between them and farmers. The low median values of contract use indicators at traders' interfaces and the interview responses of traders

substantiate the rarity of contract use at traders interfaces. There are few cases whereby traders provide loans and seeds to cash-strap farmers on conditions that the farmers should agree to sell the malt barley only to these loan-providing traders and receive sales revenues after recoupment of the loan amount.

In the view of interviewed traders, the actions of other MBVC members are decisive for traders to succeed in their performance. The high median values of dependency indicators at traders' interfaces also support this view. The success of the malt factory depends on traders' actions as they supply over 90 percent of its malt barley requirements. Paradoxically, the malt factory does not involve traders in any of its MBVC development projects. Interviewed traders unanimously indicated factory's failure to recognize their contributions in the chain as a major cause for the weak integration of the chain. The median values of indicators of asset specificity at traders' interfaces show suitability of traders' assets for malt barley trading. Some interviewed traders also explained that they have heavily invested to build storage facilities and gained long years of malt barley trading experiential knowledge both of which are specific to malt-malt barley trading.

The median values of indicators of VCI based on traders' data set are low to show weak integration between traders and their chain partners, both farmers and traders.

4.4.2. Regression analysis

As indicated earlier, MBVC involves various members and covers series of processes from supply of agricultural inputs for malt barley production till consumption of beer by the final users. The results of ordered logistics regression whereby value chain governance structure and transaction attributes, our explanatory variables are regressed against VCI, our outcome variable and interview responses were also used for the discussion to substantiate the regression results.

According to the results of ordered logit regression presented in Table 12, trust (H1) and contract use (H2) at cooperatives-farmers interface are positively related to VCI, at level of significance of $P<0.01$. The marginal effects of trust on VCI levels reported in the same table

shows that trust has a strong influence on VCI. For instance, when the ratings of trust indicators increase by one unit, say, from “neutral” to “agree”, the chance that the ratings of VCI indicators make the same change increases by 15.62 percent. Similarly, when the ratings of contract use indicators increase from “neutral” to “agree”, the probability that the ratings of VCI indicators make the same leap increases by 7.28 percent. Though contract use is positively related to VCI, the results should be interpreted with caution since farmers’ positive perception can also be due to its newness and can be temporal. It is too early to reach a bold conclusion that contract use leads to strong MBVC integration, though literature shows that contract use has positive influence on farmers’ negotiation skills and their participation in the value chain (Porter and Phillips-Howard, 1997).

The dependency of farmers on cooperatives exhibited a positive relationship with VCI at cooperatives-farmers interface since farmers highly depend on cooperatives for agricultural inputs supply. When the ratings of indicators of dependency improves by one unit from “neutral” to “agree”, the chance that ratings for indicators of VCI also make the same jump increases by 5.5 percent. Likewise, the study by Vanpoucke (2009) reported that value chain members become less opportunistic when they are highly dependent on other value chain members and that in turn leads to strong VCI. At cooperatives-farmers interface, we could not find any significant positive relationships between asset specificity and VCI, and between uncertainty and VCI, hence H4 and H5 were not supported.

Table 12: Ordered logit regression results at cooperatives-farmers interface (farmers' survey)

Ordered logistic regression		**Number of obs**	**= 320**			
		LR χ^2 (5)	**= 282.88**			
		Prob > χ^2	**= 0.0000**			
Log likelihood = -229.49048		**Pseudo R^2**	**= 0.3813**			
			Marginal effects on VCI			
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Trust	1.743**	-0.0010	-0.2914**	0.1356**	0.1562**	0.0007
Contract	0.812**	-0.0005	-0.1358**	0.0631**	0.0728**	0.0003
Dependency	0.614**	-0.0003	-0.1027**	0.0477*	0.0550**	0.0002
Asset specificity	0.186	-0.0001	-0.0310	0.0144	0.0166	0.0001
Uncertainty	0.211	-0.0001	-0.0352	0.0164	0.0189	0.0001
		Standard errors			*95% Conf. Interval*	
/cut1	2.503	0.663			1.204	3.803
/cut2	8.688	0.864			6.992	10.381
/cut3	12.190	1.020			10.192	14.188
/cut4	17.885	1.506			14.934	20.836

Significant at:
** $p < 0.01$
* $p < 0.05$
VCI, Value chain integration

The regression results at farmers-traders interfaces based on farmers' empirical data show that trust (H1), contracts (H2), dependency (H3), and uncertainty (H5) are positively related to VCI, see Table 13. Trust has strong influence on VCI at farmers-traders interface specially at the lower level of the orders of the measurement scale. For instance, when the ratings of trust indicators improve by one unit, let us say from "strongly disagree" to "disagree", the chance that the ratings of indicators of VCI make the same leap increases by 42.79 percent. The farmers' empirical data have provided significant statistical supports, at p<0.01, for all proposed hypotheses at farmers-traders interface, except for asset specificity (H4) which was not empirically supported.

Table 13: Ordered logit regression results at farmers-traders interface (farmers' survey)

Ordered logistic regression			**Number of obs** = **320**			
			LR χ^2 (5) = **262.44**			
			Prob > χ^2 = **0.0000**			
Log likelihood = -225.99609			**Pseudo R^2** = **0.3673**			
			Marginal effects on VCI			
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Trust	1.980**	-0.0151**	-0.4279**	0.4175**	0.0254**	0.0000
Contract	0.643**	-0.0049*	-0.1388**	0.1355**	0.0082*	0.0000
Dependency	0.469**	-0.0036	-0.1012**	0.0988**	0.0060*	0.0000
Asset specificity	0.213	-0.0016	-0.0461	0.0450	0.0027	0.0000
Uncertainty	0.521**	-0.0040*	-0.1125**	0.1097**	0.0067*	0.0000
		Standard errors			*95% Conf. Interval*	
/cut1	4.248	0.570			3.131	5.365
/cut2	9.782	0.909			8.001	11.563
/cut3	13.438	1.069			11.343	15.533
Significant at:						
**p < 0.01						
* P < 0.05						
VCI, Value chain integration						

Pursuant to traders' empirical results, trust (H1), contract (H2) and uncertainty (H5) have shown positive relationships with VCI at farmers-traders interface, at p<0.01 significance level though the marginal effects for uncertainty are all insignificant; whereas asset specificity is negatively related to VCI at same interface, at p<0.01 significance level, see Table 14. At this interface, when the ratings of trust indicators increase by one unit, say, from "neutral" to "agree", the chance that the ratings of VCI indicators make similar leap increases by 31.15 percent. Similarly, when the ratings of contract use indicators increase by one unit from "neutral" to "agree", the chance that the ratings of VCI indicators make the same improvement increases by 10.08 percent.

On the other hand, when the ratings of asset specificity indicators increase by one unit from "neutral" to "agree", the chance that the ratings of VCI indicators reduces from "agree" to "neutral" increase by 15.66 percent. The observed negative relationship between asset specificity and VCI in this study contradicts with the established positive relationship in past study (Dyer, 1996) and in transaction cost analysis (TCA). In the MBVC, farmers always develop negative impression when traders accumulate assets, both specific and non-specific, since they perceive assets accumulated as the act of opportunism. Moreover, interviewed farmers expressed that they are poorly handled by traders once the traders build up assets.

At farmers-traders interface, farmers explain that traders collude to lower prices and influence other terms of exchanges which weakens integration at that interface. In the view of traders, informal contracts are rarely used. Under this contracts, traders provide malt barley seeds to cash-strap farmers on credit. The farmers under such contracts, on the other hand, should agree to settle the debt through malt barley sale only to these traders at the time of harvest.

Table 14: Ordered logit regression results at farmers-traders interface (traders' survey)

Ordered logistic regression			**Number of obs** = **100.00**			
			LR χ^2 (5) = **73.77**			
			Prob > χ^2 = **0.0000**			
Log likelihood = -67.212098			**Pseudo R^2** = **0.3543**			
			Marginal effects on VCI			
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Trust	2.602**	0.0000	-0.1488**	-0.1460	0.3115**	-0.0152
Contract	0.842**	0.0000	-0.0482*	-0.0473	0.1008**	0.0028
Dependency	-0.499	0.0000	0.0285	0.0280	-0.0598	-0.0004
Asset specificity	-1.308**	0.0000	0.0748**	0.0734	-0.1566**	0.0045
Uncertainty	0.110**	0.0000	-0.0063	-0.0062	0.0132	-0.0101
		Standard errors			*95% Conf.*	*Interval*
/cut1	1.888	1.535			-1.121	4.897
/cut2	2.011	1.533			-0.994	5.014
/cut3	6.447	1.732			3.052	9.842
Significant at:						
** p<0.01						
* P<0.05						
VCI, Value chain integration						

At traders-malt factory interface, the level of VCI was positively influenced by the level of traders' trust in the malt factory (H1), and the degree of uncertainty in the exchange environment (H5), whereas our data reject other proposed relationships between exogenous variables and VCI, see Table 15. According to the marginal effects reported for trust, when the ratings of trust indicators increase by one unit, say from "disagree" to "neutral", the chance that the ratings of VCI indicators improve from "disagree" to "neutral" increases by 34.28 percent. The other marginal effects for trust and uncertainty can be interpreted same way.

Table 15: Ordered logit regression results at traders-AMF interface (traders' survey)

Ordered logistic regression			**Number of obs** = **100.00**			
			LR χ^2 (5) = **27.36**			
			Prob > χ^2 = **0.0000**			
Log likelihood = -72.242151			**Pseudo R^2** = **0.1592**			
			Marginal effects on VCI			
VCI	*Coef.*	*1*	*2*	*3*	*4*	*5*
Trust	1.441**	-0.0152	-0.3424**	0.3428**	0.0148	0.0000
Contract	-0.264	0.0028	0.0628	-0.0629	-0.0027	0.0000
Dependency	0.035	-0.0004	-0.0083	0.0083	0.0004	0.0000
Asset specificity	-0.424	0.0045	0.1007	-0.1008	-0.0043	0.0000
Uncertainty	0.952*	-0.0101	-0.2261*	0.2264*	0.0098	0.0000
		Standard errors			*95% Conf. interval*	
/cut1	1.779	1.576			-1.310	4.867
/cut2	6.134	1.588			3.021	9.247
/cut3	10.865	1.945			7.053	14.677
Significant at:						
** $p < 0.01$						
* $p < 0.05$						
VCI, Value chain integration						

In general, VCI gets stronger when trust and contract are combined to establish exchange transactions between value chain members (Morgan and Hunt, 1994). It is obvious that contracts mitigate the risks associated with varying degree of uncertainty in the exchange environment (Lusch and Brown, 1996). As pointed out earlier, contracts were recently introduced to some farmers by the ESE (1,000 farmers), Heineken N.V.(4,500 farmers) and Meta-Diageo breweries (6,000 farmers) and promising results were obtained in terms of productivity, quality and sales revenues improvements. Though contract is a vital instrument to tackle value chain members' opportunism (Zhang and Aramyan, 2009), it is a recent phenomenon in the MBVC and yet to be popularized to members to create more awareness. It is also dangerous to consider contract as a panacea for all VCI menaces since strict adherence might rather weakens VCI (Ferguson et al., 2005).

4.5. Conclusions and practical implications

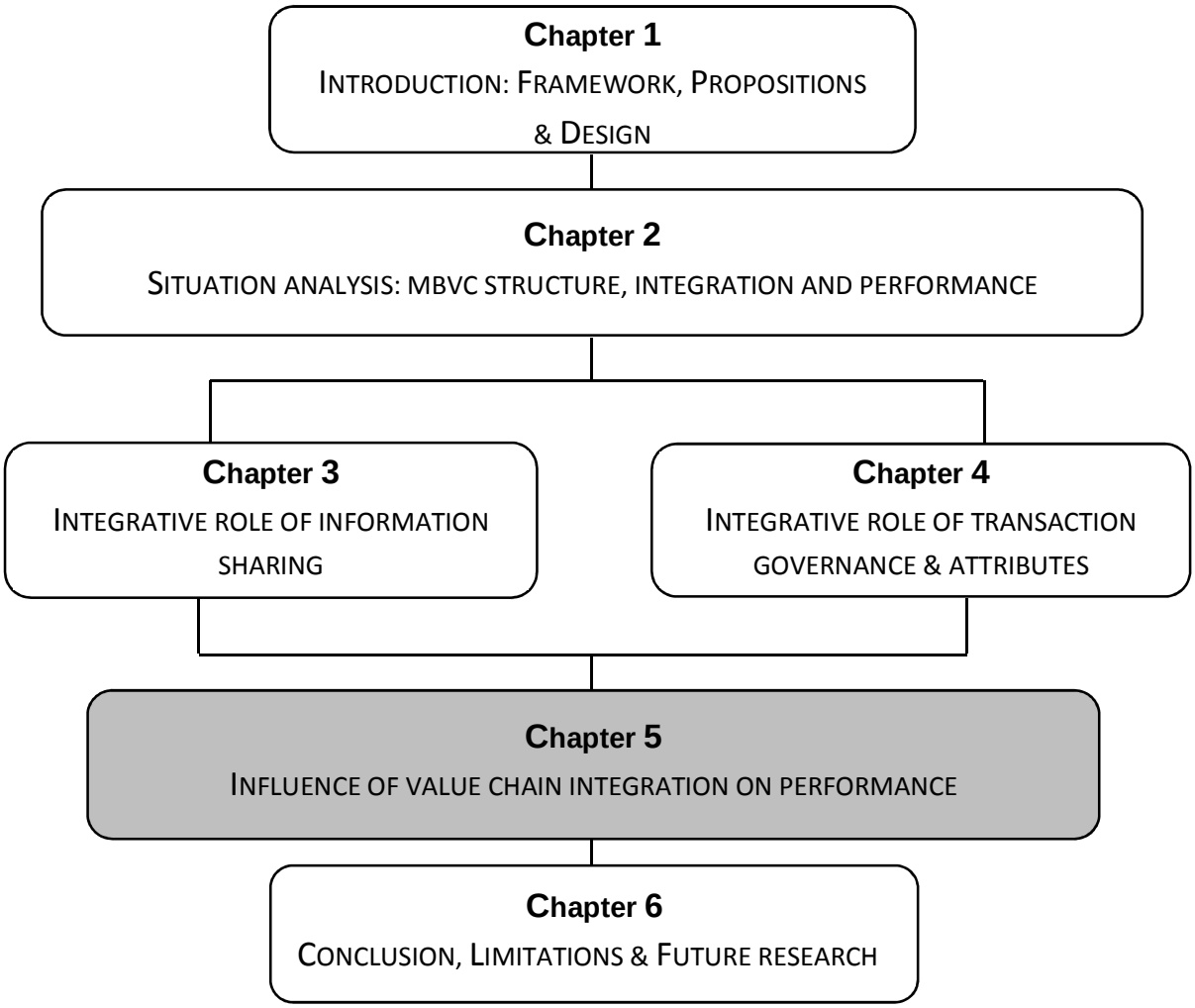
Based on the premises that value chain governance mechanisms and transaction attributes influence VCI, this paper has investigated the relationships between these constructs based on empirical data obtained from MBVC in Ethiopia. In general, trust in MBVC partners positively related to VCI at all interfaces as it boosts social bondage among value chain members.

Similarly, it was noted that contract use to organize transactions positively correlated with VCI except at traders-malt factory interface. Therefore, both trust and contract strengthen chain's integration when used to establish transactions between MBVC members.

The study also revealed that farmers are highly dependent on cooperatives for agricultural inputs supply and on traders for marketing of their malt barley. This exogenous variable demonstrated a positive relationship with VCI at cooperative-farmers and farmers-traders interfaces. Traders feel dependent neither on farmers nor on the malt factory since there are too many small-scale supplier-farmers and several groups of customers. Uncertainty in the exchange environment positively correlated with VCI at farmers-traders and traders-malt factory interfaces since farmers and traders prefer to integrate with their chain partners to averse or minimize any possible risks. On the other hand, it was found that asset specificity is negatively related to VCI at farmers-traders interfaces based on traders' empirical data which is worth noticing for this finding is quite opposite to the finding of past studies.

This study makes predominant contributions to the literature of agribusiness value chain governance and integration. Firstly, the study adapted a framework that relates VCG constructs to VCI. Secondly, it has sorted valid and reliable indicators of governance mechanisms, transaction attributes and VCI that can be replicated for similar studies in developing countries. Thirdly, it presented suitable statistical methods to investigate the correlation of VCG mechanisms and transaction attributes with VCI at different interfaces in the chain. Since trust and contract use showed consistent and predominant positive relations with VCI, MBVC members, shareholders and policymakers should formulate and implement strategies and policies that can build trust and promote contract use in the MBVC interfaces.

Although this study is the first attempt to explore value chain governance mechanisms and transaction attributes and investigate their relations with VCI in the contexts of value chains in developing countries, the use of empirical data from a single MBVC would limit the generalizability of the findings. Therefore, a study that covers more agribusiness value chains in Ethiopia or even beyond should be conducted to obtain robust findings.


Chapter 1
INTRODUCTION: FRAMEWORK, PROPOSITIONS & DESIGN
Chapter 2
SITUATION ANALYSIS: MBVC STRUCTURE, INTEGRATION AND PERFORMANCE
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Chapter 5

The Influence of Value Chain Integration on Performance: An Empirical Study

The chapter is based on:

Watabaji, M.D., Molnár, A., Manoj, K.D., Gellynck, X. (2016). The influence of value chain integration on performance: An empirical study of the malt barley value chain." *International Food and Agribusiness Management Review (IFAMR)*: *In press*.

5. The influence of value chain integration on performance: An empirical study

5.1. Introduction and objectives

As indicated earlier, value chain is a set of three or more value chain members, either organizations or individuals or both, that engage in the forward and reverse flows of materials, services, finances and/or information from sources to destinations to create value in the form of product and/or service to satisfy the needs of customers (Van Hoek, 1998; Mentzen et al., 2001; Bagchi et al., 2005). Value chain integration (VCI) deals with the management of these flows to enable the delivery of superior value to the end users (Bagchi et al., 2005). In simple terms, VCI is defined as a structure of relationship among members' (Wever et al., 2009). It is a means to create a match between demand and supply of products and/or services at every interface in the value chain (Barratt, 2004).

Through VCI, members and processes get tied together to create a synergy to overcome operational and strategic challenges (Van Hoek, 1998; Chin et al., 2014), although not easily attainable (Kim, 2009). VCI goes beyond both internal and external boundaries to improve performance both at value chain and its members' levels (Romano, 2003). It involves collaboration among value chain members (collaboration), commitment towards long-term relationships (commitment), coordination of activities at value chain interfaces (coordination) and joint decision making on key strategic and operational issues (joint decision making) which were considered as VCI constructs throughout this doctoral dissertation.

In present days' agribusiness value chains, downstream large agro-processors require small upstream suppliers to meet more and more stringent quality standards. These quality standards have become more rigorous in nature and wider in scope and hence marginalize small-scale farmers from participation in the value chains. As pointed out by Barratt (2004), the most common problems in relation to VCI that value chain members should always notice are: (1) the strong challenges that VCI constructs involve to materialize, (2) the high cost of technologies for

their realization, (3) the difficulty in the identification of the right value chain partner/s for integration, and (4) the lack of trust among the value chain members.

Past studies reported lack of clear understanding among value chain members about value chain performance (VCP) and its indicators (Simatupang and Sridharan, 2002). That is the reason why identification of suitable and appropriate VCP indicators has attracted researchers' attentions during the last decade (Aramyan, 2007). Researchers reached consensus that VCP cannot be measured through use of the same indicators for all types of value chains, rather it is advisable to use indicators customized to value chains' circumstances (Crișan et al., 2011). Moreover, VCP measurement is always difficult to undertake as value chains involve many inputs and outputs (Zhang and Aramyan, 2009). It would be important to reach consensus on as to which VCP indicators to use define their scopes prior to the investigation of the relationships between VCI constructs and VCP.

Contrary to the abundance of literature that indicate positive association between VCI and VCP (Frohlich and Westbrook, 2001; Vickery et al., 2003; Arshinder and Deshmukh, 2008; Giunipero et al., 2008; Vaart and Donk, 2008; Zhao et al., 2008; Kim, 2009; Flynn et al., 2010), the results are inconsistent (Zhang and Aramyan, 2009; Wiengarten et al., 2010; Danese and Bortolotti, 2014) and there is also a dearth of empirical evidence to support the association between VCI constructs and VCP (Vickery et al., 2003; Vereecke and Muylle, 2005; Sezen, 2008). To be more specific, empirical evidences from developing countries to support the association between VCI and VCP are scanty (Chin et al., 2014). In the view of Lotfi, Sahran, Mukhtar, et al. (2013), past studies dealt with dyadic interactions between a single value chain member and its value chain partners; while chain-level studies where not only few but also descriptive. On the other hand, Bagchi et al. (2005) noted variations in the types of associations between VCI constructs and VCP whereby commitment showed negative association with VCP while collaboration is positively related. Moreover, the types of relationships exhibited between VCI constructs and VCP under one context may not be equally valid under another (Hausman, 2001) and VCI may not always guarantee higher VCP (Vanpoucke, 2009). Therefore, the purpose of this study is to shade light on these research gaps with the help of empirical data obtained from the malt barley value chain (MBVC) in Ethiopia.

More specifically, this chapter aims to: (1) conceptualize the multi-dimensional constructs of VCI and VCP; (2) measure the current levels of MBVC integration and performance; (3) investigate the relationship between VCI constructs and VCP at chain-level; and (4) provide some policy implications to address VCI and VCP related challenges in the MBVC in particular and in the agribusiness value chains of developing countries in general.

The remaining parts of the chapter is structured as follows. In the next section, we provide the theoretical underpinning of the conceptual framework to set a base for our research hypotheses. Subsequently, the research methodology is then discussed which is followed by results and discussions. The last section presents the conclusions and practical implications.

5.2. Conceptual framework and research hypotheses

The conceptual framework of the study was adapt from past studies to postulate possible associations between VCI constructs and VCP which were investigated using empirical data obtained from the MBVC in Ethiopia. The framework is primarily based on the resource based view (RBV) which provides the rationale for VCI that creates conducive environment for pooling resources and capabilities to achieve superior VCP (Chin et al., 2014). In the view of Barratt (2004), VCI can only be realized when value chain members collaborate through resources, capabilities and risks sharing. Similarly, Kim (2009) stressed that the concepts of RBV are the key drivers of VCI. According to RBV, resources refer to both tangible and intangible assets, whereas, capabilities refer to the abilities of value chain members to utilize these resources for higher VCP. No matter how diverse and big are the resources owned by a single chain member, it is still not feasible for this member to own all kinds of resources and capabilities in-house. Therefore, VCI is the strategic means through which inimitable complementarities of resources, capabilities and risks can be acquired to register superior VCP.

As indicated in previous chapters and under the introduction section of this chapter, VCI is conceptualized in terms of four key constructs. These are: collaboration (Lotfi, Sahran, Mukhtar, et al., 2013; Wu et al., 2014), commitment (Cechin et al., 2013), coordination (Van Donk et al., 2008), and joint decisions making (Malhotra et al., 2005) to cover its broader aspects. The other

core construct in this study is VCP. In the view of Chan et al. (2003), VCP can be measured with both qualitative and quantitative indicators. In the view of Lotfi, Sahran and Mukhtar (2013), measurement indicators like added values, efficiency, and customers' satisfaction can be used. Simatupang and Sridharan (2001) suggested process, customers and financial indicators. In their study on the relationship between VCP and members' linkages, Won Lee et al. (2007) measured performance with efficiency and effectiveness indicators. Though various VCP measurement indicators are proposed, they are all highly interrelated (Vickery et al., 2003).

In most cases, financial indicators are used to measure VCP though they are incapable of capturing some aspects of performance and hence incomplete (Wu et al., 2014) and also exposed to misinterpretations (Simatupang and Sridharan, 2002). In the view of Wu et al. (2014) non-financial indicators are powerful and more inclusive. In immature value chains like the MBVC, data on financial indicators are either unavailable or not made accessible even if available. In line with past studies and data availability, four key indicators were selected to measure MBVC performance. These are: quality, responsiveness, flexibility and efficiency (Vickery et al., 2003; Droge et al., 2004; Gellynck et al., 2008; Zhao et al., 2008; Villena et al., 2011; Wu et al., 2014). These indicators are broadly acceptable for their completeness and inclusiveness (Vereecke and Muylle, 2005). In line with the study by Schloetzer (2012), MBVC members' perceptions on the following VCP measurement indicators were used in this study.

Quality: It refers to a fitness of products and/or services to the needs of customers (Lotfi, Sahran, Mukhtar, et al., 2013). In the view of Cao and Zhang (2010), quality refers to the extent to which value chain members offer reliable products and/or services that can create greater value for the customers. In this paper, quality refers to the moisture content, mix level with other barley varieties, and neatness of the malt barley grains. According to the quality standard set by the malt factory, malt barley grains with low moisture level, admixture free, neat and white are ranked high on the quality scale. These quality measures are equivalent to "attractiveness" in the definition provided for quality by Molnár (2010) to explain how appealing the appearance of the product is to the eyes of customers.

Responsiveness: it is the measure of capability of value chain members to deliver the right product and/or render appropriate service within the shortest possible time once orders are received (Molnár, 2010). Past studies consider lead-time and customers complaints as responsiveness indicators (Van Der Vorst, 2000; Molnár, 2010).

Flexibility: it refers to value chain members' capacity and capability to support changes in products and/or services specifications to meet the changing needs of customers (Cao and Zhang, 2010). In the view of Sezen (2008), product flexibility, delivery flexibility, mix flexibility and volume flexibility are important aspects of flexibility.

Efficiency: it refers to the wise use of available resources to generate the maximum possible return and to attain cost competitiveness (Cao and Zhang, 2010). It is a comparison between costs incurred and benefits gained in the course of value addition processes. It deals with process optimization to produce outputs of higher value using inputs of less value.

Based on the literature, the conceptual framework presented under Figure 10 was developed to guide hypotheses formulation, research design, and data analysis and discussion. In the framework, the main constructs are presented in bold and VCP indicators are placed in small boxes.

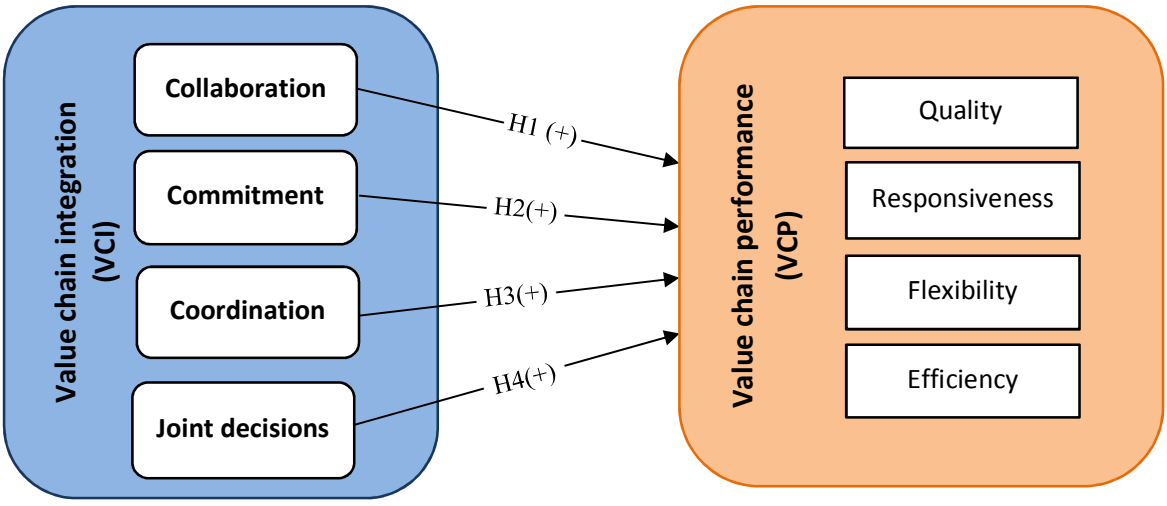


Figure 10: Conceptual framework linking VCI constructs to VCP
Source: Own compilation based on Vickery et al. (2003)

Collaboration

Collaboration among value chain members is identified as VCI construct and is understood as a win-win philosophy in which case resources, capabilities, and risks are shared among value chain members to achieve higher VCP (Vereecke and Muylle, 2005; Leat and Revoredo-Giha, 2008). In the views of Ryu et al. (2009), Vieira et al. (2009) and Arshinder and Deshmukh (2008) collaboration is a trustful, loyal and mutual partnering among value chain members to put joint efforts towards improved VCP. Collaboration is realized only when value chain members cooperate (Cao and Zhang, 2010).

Collaboration among value chain members shows the extent to which resources (Cao and Zhang, 2010; Wiengarten et al., 2010) and strategic capabilities (Vieira et al., 2009) are shared among value chain members for complementarity. In the view of Stank et al. (2001), collaboration is a low-cost strategy that reduces operational wastes and redundancies to improve product and/or service quality. Whereas, Wiengarten et al. (2010) reported that the findings of past studies are inconsistent regarding the relationships between collaboration and VCP. In their study, Vereecke and Muylle (2005) call for additional empirical studies to substantiate the positive correlation between collaboration and VCP. Based on the above premises, the following hypothesis was proposed.

Hypothesis 1: *Collaboration among value chain members positively relates to VCP.*

Commitment

Commitment to long-term relationship is defined as an enduring desire to maintain a valuable relationships (Hausman, 2001). Value chain members are committed to long-term relationship when they believe in its contributions towards higher VCP (Morgan and Hunt, 1994; Darroch and Mushayanyama, 2006; Zhao et al., 2008).

In view of Brown et al. (1996), commitment can be classified as normative and instrumental. Normative commitment is a mutual and ongoing relationship over an extended time period based on high level of trust among value chain members. Whereas, instrumental commitment

refers to the readiness of value chain members to bear the influences imposed on them by other value chain members, whose ultimate goal is either receipt of rewards or avoidance of punishments. In the view of Wu et al. (2004), commitment is a multifaceted construct with three key aspects: affective, continuance and normative commitments. Affective aspect refers to the sense of belongingness and attachment of value chain members to their chains; continuance aspect refers to the perceived high costs if value chain members exit from the value chain; and normative aspect explains the implicit and explicit obligations on value chain members to stay in their value chains.

Past studies asserted that commitment towards long-term relationships positively relates to VCP (Brown et al., 1996; Vieira and Traill, 2008). In the view of Hausman (2001), value chain members contribute less efforts and resources to ensure higher VCP when are less committed to long-term relationships. Similarly, Clarke (2006) suggests that commitment to long-term relationships is a chief strategic means to improve VCP. Based on these premises, the following hypothesis was proposed.

Hypothesis 2: *Commitment towards long-term relationships positively relates to VCP*.

Coordination

In the view of Arshinder and Deshmukh (2008), coordination of activities at value chain interfaces involves the provision of explicit definitions of all activities, processes and structures and their proper alignments with value chain goals. Coordination is the act of managing interdependences of the purchasing, operation and logistics activities along the value chain interfaces to improve VCP (Vickery et al., 2003; Arshinder and Deshmukh, 2008). In the view of Darroch and Mushayanyama (2006), coordination of activities at value chain interfaces lowers transaction costs and raises VCP. Furthermore, coordination of activities improves the responsiveness of value chain members by shortening lead times, and increase their flexibility by enhancing their capacity. Based on these premises, the following hypothesis was forwarded.

Hypothesis 3: *Coordination of activities at value chain interfaces positively relates to VCP.*

Joint decision making

Joint decision making refers to the extent to which value chain members make decisions on key strategic and operational issues together and/or share valuable information to support such decisions (Malhotra et al., 2005; Wiengarten et al., 2010). In the view of Wiengarten et al. (2010), joint decision making on key operational and strategic issues positively relates to operational performance in the value chain settings, but only when substantiated with free flow of sufficient volume and good quality information between value chain members. Though same authors conceptualize joint decision making as part of collaboration among value chain members, MBVC members like it to be considered and treated as a separate key construct of VCI. Accordingly, the following hypothesis was proposed.

Hypothesis 4: *Joint decision making on key operational and strategic issues positively relates to VCP.*

5.3. Research methodology

5.3.1. Sampling and data collection

Since the units of analyses in this study are interfaces along the MBVC tiers, both qualitative and quantitative data were collected through qualitative interviews and field survey with farmers, traders, cooperatives and union staff, and malt factory managers. Field survey were conducted with 320 farmers and 100 traders selected from two districts of Arsi zone and two districts of West Arsi zone. The details of the sampling techniques used to select the districts, farmers and traders were explained under section 1.4 of the introductory chapter of this doctoral dissertation.

According to the statistical profile of the respondents, majority of the farmers and traders are in their productive age group, 82.6 percent of farmers and 93 percent of traders are aged 50 years or less. Though education is a key to understand the importance of VCI constructs to lead to higher VCP, only 33.4 percent of the farmers can at least read and write. Contrary to this, all traders have at least attended a secondary school education. More than half of the farmers,

that is 55.8 percent, have been practicing malt barley farming for a period of ten years or less whereas about 36 percent of traders have been trading with malt barley for a period of five years or less. A fragmented malt barley production alongside other agricultural crops is practiced due to small landholding, an average of 1.85 hectares for the study sample. On top of that, the productivity of malt barley per hectare is very low, only around 2 tons per hectare per annum, compared to high productivity rate of 7 to 8 tons per hectare in Europe, for instance. Farmers should travel for more than 5 hours on average by car to sell their crop to the malt factory, the largest buyer of the malt barley in the study area.

Intensive reviews of related literature were also done to identify the most suitable VCI constructs and VCP measurement indicators to formulate the survey questionnaire and interview guide. Respondents (i.e. farmers, traders, cooperative and union staff, managers of the malt factory) were asked to indicate the extent of their agreements with statements under VCI constructs and VCP indicators, on a five-point Likert scale, where "1" corresponds to "strongly disagree" and "5" to "strongly agree".

In addition to the survey, we conducted 62 in-depth interviews with key informants of which 27 were farmers, 13 were traders, 17 were cooperatives staff, and 5 with managers at the malt factory. For all in-depth interviews, key informants were selected for being knowledgeable on VCI constructs and VCP indicators within the context of their value chain (Li and Lin, 2006; Vanpoucke, 2009).

5.3.2. Measurement scales and validation

A strict process for scale development was followed, particularly due to the fact that the study case is an immature and underdeveloped MBVC in Ethiopia. We reviewed the literature in order to identify valid and suitable constructs indicators and adapt them to the study context (Yu et al., 2013). Based on the reviewed literature and feedbacks obtained from the pilot test, we identified/formulated measurement indicators for each identified VCI constructs, our explanatory variables, and let respondents to mark them on the five-points Likert scale. We identified/formulated 5 indicators for collaboration (Cao and Zhang, 2010; Wiengarten et al.,

2010), 5 indicators for commitment (Wu et al., 2004; Zhao et al., 2008; Villena et al., 2011), 5 indicators for coordination (Simatupang et al., 2002; Arshinder and Deshmukh, 2008), and 3 indicators for joint decision making (Wiengarten et al., 2010), see Table 16.

In this chapter, the VCP, an outcome variable, is measured by quality, responsiveness, flexibility and efficiency adopted from (Gellynck et al., 2008; Sezen, 2008; Villena et al., 2011), which are all latent variables themselves. During the analysis, each explanatory and outcome variables was measured using summated median values of all measurement indicators. The m*edian* values were used for the computation of the summated scales since *mean* values can only indicate the location of estimates that do not exist within the range of the five-point scale (Molnár, 2010).

5.3.3. Data Analysis

After data sorting, within-scale factory analysis (Lin et al., 2005; Sezen, 2008) and Cronbach's alpha reliability test (Lin et al., 2005; Zhao et al., 2008; Yu et al., 2013) were applied. The factory analysis within-scale was used to check the validity of all observable indicators to measure the intended multivariate latent variables, while Cronbach's alpha reliability scores, also called scales of reliability, were used to measure the internal consistency of indicators under a given construct, that is, the measure of relatedness of indicators to manifest a single construct. The summary of factor loadings and alpha reliability scores for each construct used in this study are presented in Table 16. All measurement indicators within-scale factory analysis loaded greater than 0.70 except for PRF1 at farmers-traders interface and for PRF3 at farmers-cooperatives interface that loaded 0.645 and 0.69 respectively, see Table 16.

In past studies, factor loads that are higher than 0.50 claimed to demonstrate sufficient level of validity (Lin et al., 2005; Yu et al., 2013). Few observable indicators that loaded lower than 0.50 were dropped from further analyses for they do not sufficiently manifest the latent variable they are supposed to manifest, see Table 16. Except for coordination at traders-malt factory interface, Cronbach's alpha reliability scores are higher than 0.70 revealing strong consistency among observable indicators under each multivariate latent variable (Lin et al., 2005; Zhao et al., 2008).

Table 16: Factor loading and Cronbach's α *scores* (farmers' and traders' survey)

Code	Construct/Indicator	Farmers	Traders		
		(C-F)[a]	(F-T)[b]	(F-T)[b]	(T-AMF)[c]
CLB	*Collaboration*	*0.792*[d]	*0.791*	*0.733*	*0.828*
CLB1	We and our partners see each other units of the same firm	drop	0.737[e]	drop	0.804
CLB2	We and our partners combine resources on common projects	drop	drop	drop	drop
CLB3	We unreservedly share our knowledge with our partners	0.810	0.792	0.751	0.814
CLB4	Our partners unreservedly share their knowledge with us	0.868	0.812	0.867	0.747
CLB5	We and our partners expend joint efforts to improve our relations	0.844	0.833	0.815	0.866
CMT	*Commitment*	*0.817*	*0.810*	*0.882*	*0.701*
CMT1	Our relations with our partners are based on mutual benefits	drop	drop	0.873	drop
CMT2	Our relations with our partners continue for a long time	0.843	0.819	0.907	0.765
CMT3	We like to maintain our association with our partners	0.843	0.831	0.753	0.855
CMT4	We invest more in the relationship with our partners	0.732	0.774	0.898	0.750
CMT5	We have stable relations with our partners	0.792	0.769	drop	drop
CRD	*Coordination*	*0.778*	*0.791*	*0.716*	*0.620*
CRD1	We and our partners jointly manage our activities	0.772	0.827	drop	0.825
CRD2	We work closely with our partners on our activities	0.771	0.777	0.885	drop
CRD3	We and our partners always share activity schedule	0.800	0.793	0.885	drop
CRD4	We have clear guidelines for interactions with our partners	drop	drop	drop	0.825
CRD5	Our partners strictly follow our interaction guidelines	0.759	0.726	drop	drop
JDM	*Joint decision making*	*0.812*	*0.807*	*0.849*	*0.816*
JDM1	We and our partners jointly decide on product type	0.837	0.831	0.901	0.800
JDM2	We and our partners jointly decide on process improvements	0.880	0.897	0.877	0.902
JDM3	We and our partners jointly set product prices	0.841	0.826	0.854	0.869
PRF	*Value chain performance*	*0.743*	*0.834*	*0.711*	*0.707*
PRF1	We improved quality by working closely with our partners	0.821	0.821	0.654	drop
PRF2	We improved responsiveness by working closely with our partners	0.727	0.727	0.843	0.821
PRF3	We enhanced flexibility by working closely with our partners	0.691	0.691	0.901	0.842
PRF4	We improved efficiency by working closely with our partners	0.785	0.785	drop	0.761

[a](C-F), Cooperatives-farmers interface; [b](T-F), Traders-farmers interface; and [c](T-AMF), Traders-Assela Malt Factory interface

[d]*Italic* figures are α scores

[e]Non-italic figures are factor loads

In this study, Structural Equation Modelling (SEM) technique was used for data analysis. This technique was chosen for its strength and suitability for the conceptual model developed for this study. As indicated by Grapentine (2000) and Tomarken and Waller (2005), SEM technique has the ability to specify latent variable models by providing separate estimates for relations among latent variables and their manifest indictors (measurement models) and show the relationship among exogenous and endogenous latent variables (structural model); it always provides higher R^2 values compared to other techniques; and it provides more information on

the relative strength of observed indicators to explain the latent variables as confirmatory factor analysis is nested in it.

As noted by Nachtigall et al. (2003), model fit to empirical data can easily be checked using model-fit-statistics under SEM technique. The fact that the fit statistics are acceptable somehow indicate whether or not (1) observable measurement indicators do fairly explain the latent constructs that they intend to manifest (measurement models); and (2) the data sets support the proposed relationships between exogenous and endogenous variables (structural model), see Figure 11.

Similar to the works of Wang et al. (2015), Won Lee et al. (2007), and Lin et al. (2005), four SEM diagrams were formulated at four interfaces, see Table 17, in the MBVC based on farmers' and traders' data sets. In all cases, the models treat collaboration, commitment, coordination and joint decision as latent-independent variables and VCP as latent-dependent variable. All measurement indicators with factor loadings of 0.50 or more were used to construct SEM diagrams and to run further analysis while other loading lower than the minimum requirement were dropped, see Table 16.

A sample SEM diagram at farmers-cooperatives interface is presented under Figure 11 though four SEM diagrams were drawn for the entire analyses. The summated median values of the set of manifest indicators were used to represent all multivariate exogenous and endogenous latent variables to run our models since summated *mean* values only indicate the locations of estimates that do not exist within the five-point measurement scale (Molnár, 2010). Four separate SEM models were run, two for each data set to assess the relationship between four exogenous latent variables and an endogenous latent variable.

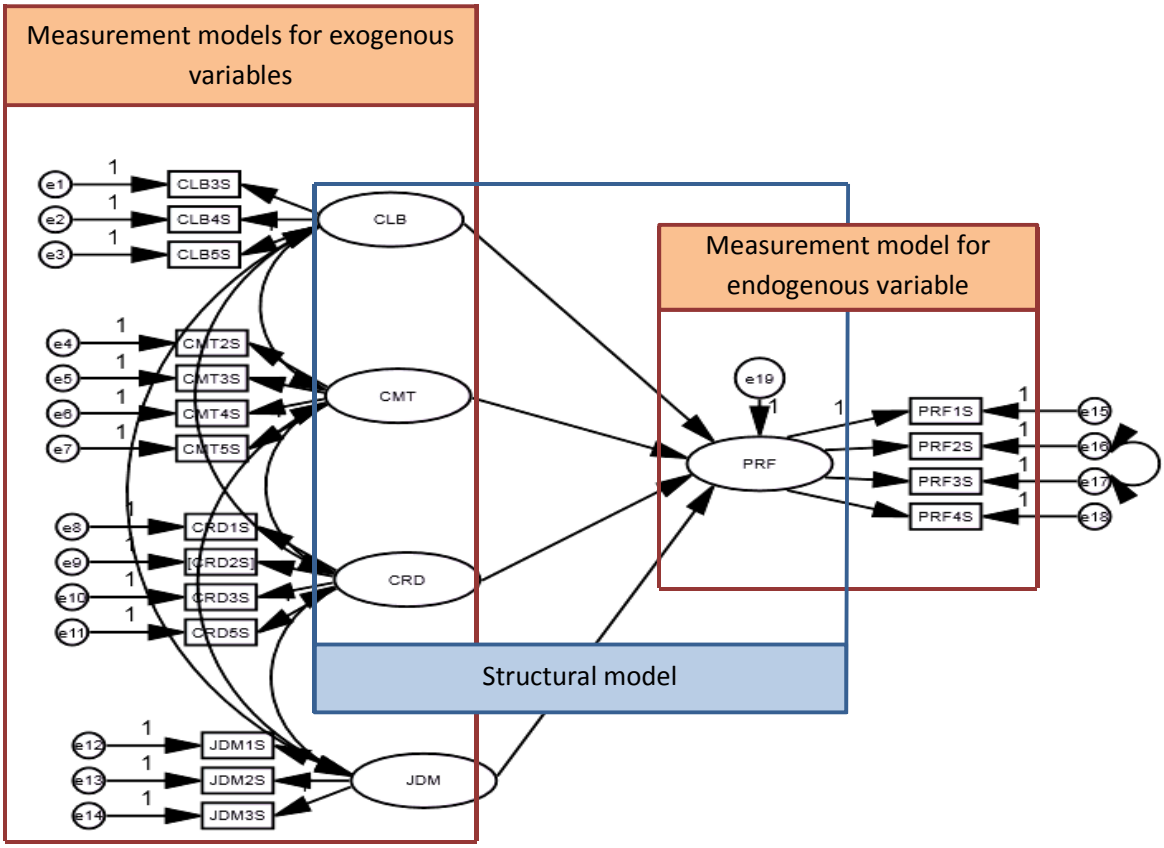


Figure 11: SEM model at farmers-cooperatives interface using AMOS 22.

Notes: e1-e19: are codes for error variables; CLB3S, CLB4S and CLB5S are codes for observed indicators under collaboration (CLB) while CLB1S, CLB2S are dropped for low loading; CMT2S-CMT5S are codes for observed indicators under commitment (CMT); CRD1S-CRD5S are codes for observed indicators under coordination (CRD) while CRD4S was dropped for lower loading; JDM1S-JDM3S: are codes for observed indicators under joint decision making (JDM); and PFR1S-PFR4S: are codes for observed indicators under VCP (PRF), see Table 16.

The models were run on SPSS-AMOS version 22 statistical software. The works of Yu et al. (2013) and Wang et al. (2015) were followed in which case the goodness-of-fit statistics of the models were assessed by (1) chi-square ($\chi 2$), (2) normalized chi-square ($\chi 2/df$), (3) comparative fit index (CFI), (4) root mean squared errors of approximation (RMSEA), and (5) incremental fit index (IFI). An acceptable chi-square ($\chi 2$) value relative to a given degrees of freedom measures how well the observed distribution of the data sets fit with the distribution that is expected if the variables are independent. This also implies that the theoretical model significantly replicates the samples variance-covariance relationships in the matrix (Schumacker and Lomax,

2004). The comparative fit index (CFI) measures the improvements of non-centrality obtained by switching from one model to another. The root mean squared errors of approximation (RMSEA), which is also called discrepancy per degree of freedom, provides an indication of a discrepancy between observed and implied variance-covariance matrices (Hailu et al., 2005). These goodness-of-fit statistics were computed at four interfaces and presented in Table 18 for farmers and Table 19 for traders along with their acceptable thresholds.

Table 17: MBVC integration interfaces

INTERFACE
(F-C) = Farmers' perceptions about cooperatives' contributions towards MBVC performance (F-T)[a] = Farmers' perceptions about traders' contributions towards MBVC performance (T-F)[b] = Traders' perception about farmers contributions towards MBVC performance (T-AMF) = Traders' perceptions about AMF's contributions towards MBVC performance *Interfaces [a](F-T) and [b](T-F) are same, except the former is based on farmers' perception while the later on traders' perception* *AMF, Assela Malt Factory*

Table 18: Model fit statistics (farmers' survey, n = 320)

Statistic	**(C-F)[a]**	**(F-T)[b]**	**Threshold values [C]**
χ^2	359.24	333.86	<=2793.8
df	124	124	<=300
χ^2/df	2.897	2.692	<=5.00
CFI	0.915	0.926	>=0.90
RMSEA	0.077	0.073	<= 0.08
IFI	0.916	0.927	>=0.90
[a](C-F), Cooperatives- farmers interface; [b](F-T), Farmers-traders interface; significant at: *P* <0.01 Threshold values[C], adopted from Yu et al. (2013)			

Table 19: Model fit statistics (traders' survey, n = 100)

Statistic	**(F-T)[a]**	**(T-AMF)[b]**	**Threshold values**
χ^2	141.67	134.19	<=2793.8
df	79	78	<=300
χ^2/df	1.793	1.720	<=5.00
CFI	0.929	0.914	>=0.90
RMSEA	0.090[c]	0.085[c]	<= 0.08
IFI	0.931	0.917	>=0.90
[a](F-T), Farmers- traders interface; [b](T-AMF), Traders-Assela Malt Factory interface; significant at: *P* <0.01 [C]RMSEA values slightly higher than the threshold values (Yu et al., 2013)			

5.4. Results and discussions

According to SEM steps, the research hypotheses in this study can be tested once it is assured that the data sets collected for the study fit the model quite well, see Table 18 and Table 19. The study findings were discussed in line with the proposed research hypotheses. Following the conceptual framework that was presented in Figure 10, we proposed positive interplays between VCI constructs, our latent-independent variables, and VCP which is our latent-dependent variable at four interfaces, see Table 17.

The goodness-of-fit statistics generated from SEM models based on farmers' and traders' data sets are within acceptable range, except RMSEA values computed at traders' interfaces. The RMSEA values at traders-farmers and traders-malt factory interfaces were 0.090 and 0.085 respectively, see Table 19, which are slightly higher than the threshold value of 0.08 (Yu et al., 2013). Based on modification indices generated by AMOS software, a double headed covariance arrow was drawn between e16 and e17 in the SEM diagram in order to improve model fit (Janssens et al., 2008; Wang et al., 2015) see Figure 11. The modification has resulted in the reductions of chi-square values from 378.01 to 359.24 and RMSEA values from 0.080 to 0.077. Even though RMSEA values of 0.05 or less demonstrate the best fit, still values between 0.05 and 0.10 are acceptable for a reasonable fit (Han, 2009). Therefore, the generated model fit statistics reveal that the data sets would fit to the models quite well, except RMSEA value for traders' data set which is slightly high probably due to the small sample size of traders.

Table 20: Results of structural model (farmers' survey, n=320)

Hypothesis : Path	**(C- F)[a]**		**(F-T)[b]**	
	Path coefficient	**t-value**	**Path coefficient**	**t-value**
H1: Collaboration → performance	-0.22	0.948	0.20	1.077
H2: Commitment→ performance	0.18	1.039	0.62	3,124**
H3: Coordination → performance	0.56	1.994*	0.18	0.685
H4: Joint decision making→ performance	0.36	2.427*	-0.22	1.524

[a](F-C), farmers-cooperatives; and [b](F-T), farmers-traders interfaces; significant at:
**p<0.01
*p< 0.05

According to the outputs of the structural models on farmers' data set only coordination (H3) and joint decision making (H4) are significant to positively correlate with performance at farmers-cooperatives and commitment (H2) significantly relates to performance at farmers-traders interfaces with standardized path weights of 0.56, 0.36 and 0.62 respectively, see Table 20. The *t*-values of coordination (H3) and joint decision making (H4) at farmers-cooperatives interface are significant at $p<0.05$, whereas the *t*-value for commitment (H2) at farmers-cooperatives interface is significant at $p<0.01$.

The *t*-values of other hypotheses at farmers' interfaces are less than the minimum threshold of 1.96 which implies rejection of the proposed relationships (Janssens et al., 2008). According to the standardized path weights for farmers' data set, coordination of activities (H3), and joint decision making (H4) at farmers-cooperatives interface significantly correlate with VCP.

The cooperative staff that were interviewed also noted a relationship between coordination of agricultural inputs supply and various farming activities and performance at farmers-cooperatives interface. Moreover, they expressed that joint decision making on products type, prices, and operation process improves performance at farmers-cooperatives interface. Therefore, active participation of farmers in the decision making processes of cooperatives positively relates to performances. Consistent with the finding of this study, Van Donk et al. (2008) noted a positive relationship between joint decision making on inventory types and batch sizes and performance as it provides an extra flexibility to value chain members.

The fact that farmers' data set is statistically predominant to support the proposed positive relationships between coordination and performance (H3), joint decision making and performance (H4) at farmers-cooperatives interface and between commitment and performance (H2) at farmers-traders interface goes hand in hand with the findings of past studies. For instance, Simatupang et al. (2002) noted a positive relationship between coordination and performance as coordination improves both flexibility and responsiveness. Similarly Stank et al. (2001) and Lee et al. (1997) noted a positive correlation between coordination and performance as coordination reduces costs associated with duplication of activities and hence improves efficiency.

At farmers-traders interface, commitment towards long-term relationships significantly correlates with performance. In the view of interviewed farmers, most malt barley traders are egocentric that always try to maximize own interests at the expense of other value chain members by showing less commitment towards long-term relationships. The egotism of traders is regarded by farmers and other chain members as critical performance menace. In our opinion, farmers' desire to work with committed traders in the MBVC is a source for farmers' perception of positive correlation between commitment and performance at farmers-traders interface. In line with this finding, Clarke (2006) noted a positive relationship between value chain members' commitment towards long-term relationships and performance as commitment reduces the time and costs associated with recurrent disputes, posturing and renegotiations. In the view of Morgan and Hunt (1994), commitment towards long-term relationships improves performance particularly if complemented with high level of trust and free flows of information along the value chain.

On the other hand, many researchers noted a positive relationship between collaboration among value chain members and performance (Vereecke and Muylle, 2005; Cao and Zhang, 2010), farmers' data set did not support this view. Such a contradiction may be due MBVC members' unaware of the strategic importance of VCI to bring performance improvements. From the farmers' interviews, it was learnt that traders are egotist to collaborate with the farmers and that lowered their performance. The malt factory considers traders as opportunists and always reluctant to engage them in any of its MBVC improvement programs. On the other hand, interviewed traders expressed their resentment about the exclusive strategies followed by the malt factory against them.

Contrary to the expectation of the authors of this paper, the path coefficients based on traders' data set are statistically insignificant to support the proposed hypotheses at traders' interfaces, see Table 21. Therefore, it is opined that traders' localized thinking and egotism must have contributed to the statistical insignificance of the coefficients. In the view of interviewed malt factory managers, traders are self-seeking and mischievous who always go after their own greedy profit motives. They go to the extent of deceiving the factory on malt barley weight by soaking it in water and on price by mixing superior qualities/varieties malt barley with inferior

ones. In the view of Cao and Zhang (2010), egotistic actions of value chain members always diminish VCP. It is harmony among value chain members, not their isolation, that would likely lead to superior VCP (Lambert and Cooper, 2000; Gellynck et al., 2008; Vanpoucke, 2009). Moreover, we also suspected that the small sample size of traders would have its own contribution to the lack of significant statistical support for our proposed relationships at traders' interfaces.

Table 21: Results of the structural model (traders' survey, n=100)

Hypothesis : Path	**(T-F)[a]**		**(T-AMF)[b]**	
	Path coefficient	**t-value**	**Path coefficient**	**t-value**
H1: Collaboration → performance	-0.78	1.724	-0.28	0.701
H2: Commitment→ performance	0.45	0.808	-0.49	1.037
H3: Coordination → performance	0.47	0.530	0.25	1.344
H4: Joint decision making→ performance	-0.59	0.660	0.09	0.213

[a](T-F), Traders-farmers and; [b](T-AMF), Traders-Assela Malt Factory interfaces

The malt factory managers are scared of the poor quality of malt barley supplied by traders which constitutes over 90 percent of the factory's total purchase. Similarly, Yu et al. (2013) noted no significant correlation between VCI constructs and VCP when value chain members are dissatisfied by low service level of chain partners. The study by Wiengarten et al. (2010) on collaborative value chain practices also found no significant relationship between joint decision making and VCP with poor information sharing between value chain members. The traders' data set offered no support to the hypotheses of the study, partly because of lack of awareness, regarding the relationship between VCI constructs and VCP.

Likewise, interviewed farmers strengthened managers' views by saying that traders adjust the measurement scale in order to read as low as 85 percent of the actual weight of malt barley supplied which is even difficult to control as they can make the adjustment within a moment. On the other hand, traders regard farmers' and the factory's accusations as character assassination which always threatens their long-term participation in the chain.

It is, however, interesting to point out that results from farmers' data set moderately supported our hypotheses than traders' data set which supported none of the hypotheses. The varying levels of recognitions that the malt factory gives to farmers and the traders is suspected to

cause perception differences. The malt factory has been providing several direct and indirect supports to farmers to improve their productivity and to establish direct linkages or through cooperatives, though unsuccessful. Moreover, MBVC members have not yet started to consider VCI constructs as part of their strategic means to revive performance of the chain. Generally speaking, the findings of this study highlight the assertion that VCI constructs do not always perceived to lead to higher VCP, rather, it depends on the context of the value chain under consideration.

5.5. Conclusion and practical implications

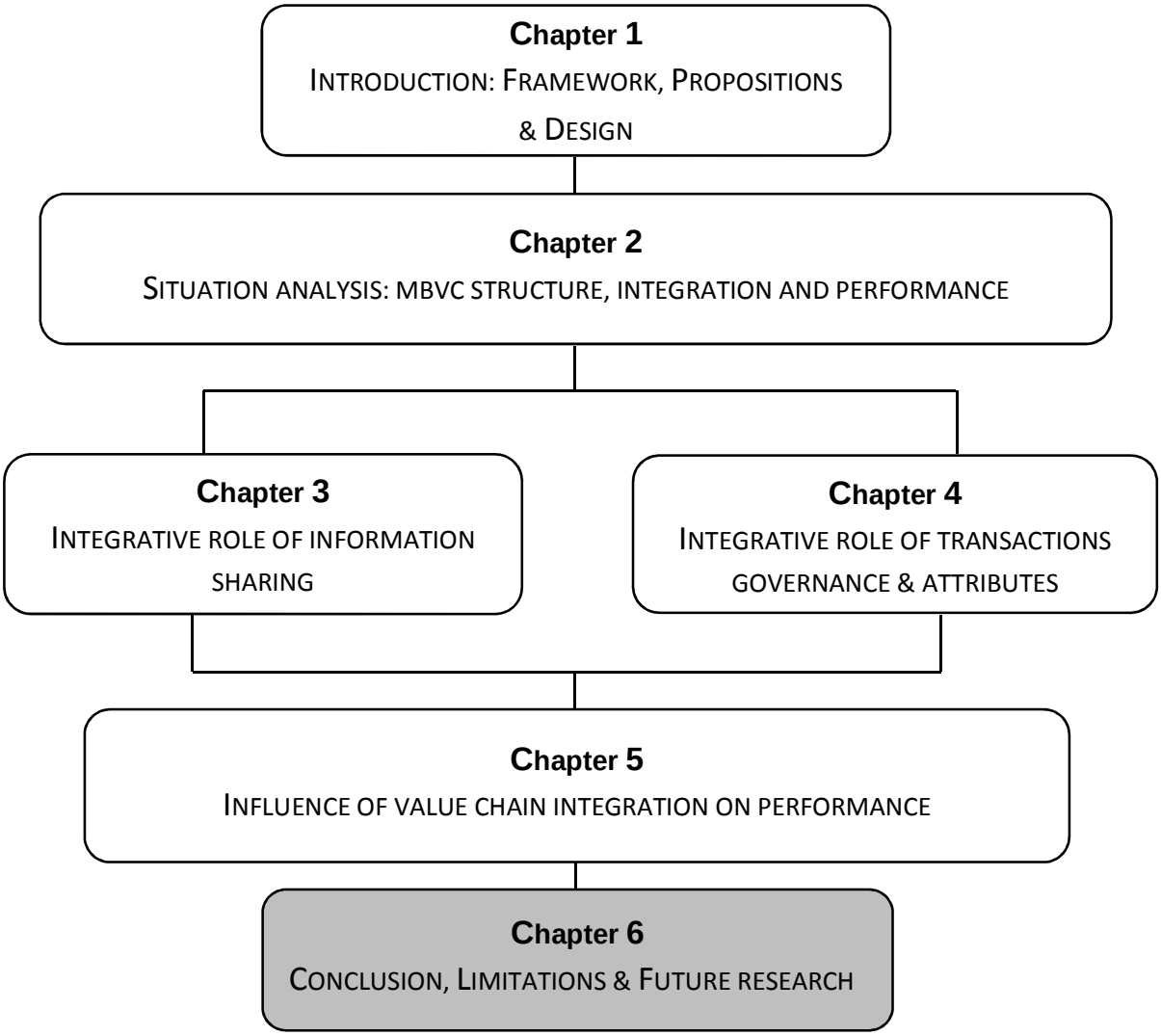
The study presented in this chapter provides better insights on the relationship between VCI constructs and VCP based on the data set obtained from the MBVC in Ethiopia. VCI incorporates the concepts of collaborations among value chain members, commitment towards long-term relationships, coordination of activities at value chain interfaces and joint decision making which were treated as dependent latent-variables. Whereas, VCP is the single endogenous variable as manifested by its four key indicators, namely: quality, responsiveness, flexibility and efficiency.

The fact that very few proposed relationships received significant empirical supports at the studied interfaces must be due to the particularity of the contexts of the developing country where the MBVC operates which makes our findings more interesting. This study hinted that upstream MBVC members, mostly farmers and traders, have not yet started to consider VCI and its constructs as strategic means to revive the VCP. In the view of the researchers, the low level of maturity of the MBVC and lack of awareness of its members about the strategic importance of VCI constructs to improve performance are the major contributors to the unique findings.

Among the hypotheses of this study, only coordination and joint decision making at farmers-cooperatives interface and commitment at farmers-traders interface received significant support to have positive correlations with VCP. The significant empirical supports obtained for these hypotheses could indicate entry points for interventions. The lack of empirical supports for the rest of the hypotheses can be attributed to low level of understanding of MBVC members about the importance of working as a chain to achieve higher and sustainable VCP

outcomes and their failures to recognize efforts of other chain members for the successful performance of their value chain.

Though the enforcement of VCI constructs is too expensive, members of the MBVC should be encouraged to consider these constructs as their strategic means to revive performance. More specifically, upstream members of MBVC should be assisted by the malt factory, breweries and other collaborators to understand the importance of VCI constructs in this regard. Moreover, MBVC members and policymakers should establish salient “rules of the game” at every interface of the chain to promote value chain thinking all along the chain and trigger VCI practices so as to enhance VCP outcome. Though the use of data sets from a developing country is an important empirical contribution by itself, more studies should be undertaken before these findings can be generalized to other value chains in Ethiopia and even beyond.


Chapter 1
INTRODUCTION: FRAMEWORK, PROPOSITIONS & DESIGN
Chapter 2
SITUATION ANALYSIS: MBVC STRUCTURE, INTEGRATION AND PERFORMANCE
Chapter 3
INTEGRATIVE ROLE OF INFORMATION SHARING
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Chapter 6

Conclusions, Limitations and Future Research

6. Conclusions, limitations and future research

6.1. Conclusions

This doctoral dissertation focuses on the broader key constructs of VCI which plays a bridging role between VCS and VCP. The influences of VCS constructs such as value chain members' distributions both along and within geographic areas and chain tiers, information sharing between members, and transaction governance on VCI and the influences of VCI constructs on VCP were fully investigated based on survey data and qualitative responses obtained from the MBVC in Ethiopia. In this dissertation, VCI is conceptualized based on its four key aspects, termed as VCI constructs. These are (1) collaboration among value chain members by way of sharing resources, knowledge and risks, (2) coordination of various activities (i.e. purchasing, operation and logistics related) along the value chain, (3) commitment of value chain members towards long-term relationships, and (4) joint decision making on key operational and strategic issues like product specification, prices, technology selection and so forth.

In this concluding chapter, we summarize the key results that were discussed in each chapters of the dissertation by way of revisiting our research propositions presented under the introductory chapter. Four key propositions were extracted from our conceptual framework and discussed to visualize the link between VCS constructs and VCI and between VCI constructs and VCP in the context of MBVC in Ethiopia. Each proposition is revisited in the following paragraphs.

1) *The distributions of value chain members along and within geographic areas and chain tiers negatively relate to VCI*

   This proposition was mainly based on the studies by Stock et al. (2000) that found a negative relationship between disperse geographic location of value chain members and VCI, and by Lambert and Cooper (2000), that concluded that longer horizontal structure due to more number of tiers and wider vertical structure due to more number of value chain members within each tier cause the VCI weaker. In the studied MBVC, there are about half a million

malt barley farmers, hundreds of traders and tens of cooperatives organizations, a single malt factory and four breweries which are scattered over wider geographic areas. In addition to the dispersed geographic locations of these members, there are large number of members at farmers and traders tiers forming wider vertical structure at those upstream tiers. The wider-vertical structure at the upstream tiers of the chain is not well-organized due to poorly organized cooperatives while such institutions are vital to organize the large number of farmers for effective linkage with the large agro-processors at the midstream and downstream of the chain.

In the MBVC, cooperatives are very weak and poorly organized due to several causes. Among those factors that weakened cooperatives, the major ones are: negative perceptions of farmers towards cooperatives due to their bitter memories about the bad legacies cooperatives left in yesteryears, poor comparative leadership since cooperatives leaders are practically nominated from among member-farmers mainly due to their behavioral qualities than managerial skills, lack of proper support from responsible governmental offices, unfair competition from traders, and lack of flexibility that emanate from the formal organizational structures and setups of these cooperatives. On top of these shortcomings, cooperatives are overstretched with the distribution of agricultural inputs than the marketing agricultural outputs, i.e. malt barley, though the marketing aspect is equally or even more important to the farmers in terms of improving their earnings and lives.

As a result, farmers are forced to sell malt barley to traders at very low prices as pre-conditions set for direct sales to the malt factory are quite difficult to fulfil. The participation of traders with the intention of grasping more benefits than the value they add due to the gaps created by cooperatives' failure to link farmers to the big agro-processors has created a long horizontal structure of the MBVC which is not an optimal size. The qualitative responses obtained through interviews with value chain members indicate that disperse geographic location of members (i.e. farmers from the malt factory and the malt factory from breweries), wide vertical arrangement of members in the upstream tiers, and long horizontal structure due to many hands of traders with varying capacities in the collection of malt barley weakened MBVC integration.

The MBVC chain members and their stakeholders should look for possible ways of redressing these structural problems in relation to the distributions of value chain members. The best way to address this problem could be the establishment of the common platform for partnership among the value chain members. This platform should all the value chain members to meet regularly to discuss on issues of how to better organize themselves for stronger VCI.

2) *Information sharing between value chain members positively relates to VCI*

As thoroughly explained in the third chapter of this dissertation, information sharing between value chain members has already attracted the attentions of researchers due to its influence on VCI (Bagchi and Skjoett-Larsen, 2003; Awad and Nassar, 2010; Lotfi, Mukhtar, et al., 2013). In order to better understand information sharing and its influence on VCI, this doctoral research paid special attention to the key constructs of information sharing (i.e. information volume, information quality and communication channels use to share information between the MBVC members. The varieties and the level of details that the information shared between value chain members involve were used as key measures of information volume whereas accuracy, relevance and timeliness of information were used to measure information quality. Since MBVC members at the studied interfaces do not use advanced electronic information transmissions techniques, the traditional communication channels use such as face-to-face contacts, telephone calls, formal and informal meetings were considered throughout this doctoral research.

The overall assessment of the descriptive statistics shows low level of information sharing between MBVC members due to factors like inconsistent information systems, lack of awareness on the value of information, lack of information sharing plans, and lack of trust among value chain members to share information. The proposed positive relationships between our explanatory variables (i.e. information volume, information quality and communication channels use) and our outcome variable (i.e. value chain integration) received sufficient empirical support at most of the studied interfaces with few exceptions. It was also observed that traders' survey data have supported less number of proposed

relationships compared to that of farmers' survey data probably due to small sample size, traders' desirability bias and dissatisfaction due to severe allegations of opportunism against traders by other value chain members.

Those identified barriers to information sharing help value chain members and their collaborators to take appropriate actions to improve the strength of VCI. For instance, farmers and their chain partners could benefit when harmonize their information sharing systems. They should agree on how to share specifications, demand and delivery schedules of both agricultural inputs and malt barley at the right time, place using communication channels. Since farmers prefer to share information during informal social gathering, their value chain partners, especially traders should better utilize this channel to expedite information sharing with the farmers. The lack of electricity supply in rural villages to charge phone batteries and the high rate of mobile use constrain farmers to use their mobile phones to share information with their chain partners. This problem can easily be tackled if alternative means to charge phone batteries and top ups to support mobile calls are provided to the farmers by their chain partners and/or other collaborators.

3) *Transaction governance mechanisms and attributes positively relate to VCI*

As explained in chapter four, VCG is a dynamic of power distribution among value chain members with which these members influence and control the actions of chain partners (Johnston and Meyer, 2008); a framework of members' relationships (Crișan et al., 2011); and means of organizing transactions in a manner that leads to stronger VCI (Menard, 2006). Broadly speaking, VCG can take either contractual or relational form or the combinations of both (Ferguson et al., 2005; Zhang and Aramyan, 2009). These governance mechanisms are not universally and equally applicable to all value chain circumstances and not suitable even if applied, rather the particularity of contexts of the value chains and attributes of the exchange transactions themselves would determine their choice (Fischer et al., 2008; Molnár, 2010).

In the view of Williamson (1985), effective value chain governance mechanisms should be chosen to enhance the strength of VCI. This scholar also emphasized on the importance of transaction attributes while making choice of VCG mechanisms though little attention was paid to their direct influences on VCI. The study presented in chapter 4 is highly relevant as it investigates the influences of transaction governance mechanisms and attributes on VCI using survey data collected from 320 farmers and 100 traders and interview responses compiled from 65 members working at the various interfaces of the MBVC in Ethiopia.

Though the use of written contacts is a recent phenomenon in the MBVC, specifically between farmers and their value chain partners, informal oral contracts have been used since long. In many places at the study area, traders provide cash loans and better quality malt barley for seeds on credit to cash-strapped farmers under binding oral or written contracts which oblige the farmers to sell back their marketable surplus malt barley only to these particular traders upon harvest. The debtor-farmers receive sales revenues calculated based on very low prices offered by traders just at the time of harvest after the deduction of the loaned amounts. Such informal contracts always suppress farmers' interests as traders always craft the contract-terms in a manner that favors them. Such contracts do not give farmers any chance to wait even for the release of the prices of the malt factory which are often better than traders' prices.

In the MBVC, both relational and contractual mechanisms demonstrated significant positive influences on VCI except at traders-AMF interface. At traders-malt factory interface, contracts did not show significant influence on integration most likely due to the very low rate of contract use and the low level of trust between the two which weakens integration irrespective of contract use. Though large agro-processors (i.e. the malt factory and breweries) are the ones that should practice contract farming with cooperatives in lieu of small-scale farmers in developing countries (Glover, 1987), the malt factory has not yet intervened in this regard. Local breweries have already started some pilot programs of contract farming with few cooperative in lieu of small-scale farmers with an intention to gradually scale it up to wider coverage particularly if good results are forthcoming from the pilot programs of contract farming. In fact, the completed pilot programs have shown

improvements both in terms of quantity and quality of malt barley production and delivery except the occurrence of minor moral hazard and adverse selection problems which future contracts should tackle through well designed contract terms.

The influences of transaction attributes on VCI varied from interface to interface and from member to member. At farmers' interfaces, both dependency and uncertainty are positively related to VCI. Farmers always feel highly dependent on cooperatives for input supplies and on traders for malt barley marketing and hence prefer to integrate with both. The risk averse behavior of farmers encourages them to integrate with traders to avoid or at least reduce the magnitude of risks associated with uncertainties in the exchange environment. Since farmers perceive that traders accumulate assets, both specific and non-specific, at their expenses, they negatively associate asset specificity with VCI at the interface between them and traders. The less specificity of assets owned by farmers and traders is the reason why our empirical data failed to provided predominant support to the proposed positive association between asset specificity and VCI at the other interfaces.

4) *VCI positively relate to VCP*

As it is explained throughout the dissertation, VCI deals with the management of both forward and backward flows of materials, services, finance, knowledge and/or information to enable the delivery of values in the form of product and/or service to the end users (Van Hoek, 1998; Mentzen et al., 2001; Bagchi et al., 2005). The objective of VCI is to overcome the bottlenecks to those flows caused by both internal and external boundaries to achieve higher performance both at value chain and individual value chain member's levels. Throughout this doctoral dissertation, VCI was conceptualized based on four key constructs. These are: *collaboration* among value chain members, *commitment* of these members towards long-term relationships, *coordination* of activities at value chain interfaces, and *joint decision making* on key operational and strategic issues. These key constructs were explained mainly in the fifth chapter of this dissertation.

Previous studies have clearly pointed out that common understanding regarding VCP indicators does not exist among value chain members (Simatupang et al., 2002; Aramyan, 2007) and a single indicator cannot be used at all interfaces even in a single value chain let alone to use it for various value chains, rather VCP measurement indicators should be fitted to existing circumstances of the value chain in question (Crișan et al., 2011). Accordingly, we identified four VCP indicators, namely: quality, responsiveness, flexibility and efficiency based on past studies (Vickery et al., 2003; Gellynck et al., 2008; Molnár, 2010), due to the clarity and ease of use of these indicators in the context of the MBVC in Ethiopia.

Since the fifth chapter aimed at the investigation of whether VCI constructs are positively related to VCP as measured by the combined average of quality, responsiveness, flexibility and efficiency indicators, survey data were collected from 320 farmers and 100 traders and qualitative interview responses were also compiled from 65 MBVC members in Ethiopia. The structural equation models (SEMs) were fit to farmers' and traders' survey data both at farmers' and traders' interfaces to investigate whether the proposed positive relationships between VCI constructs and VCP hold true. At farmers-cooperatives interface, coordination of activities and joint decision making have demonstrated positive influences on VCI whereas commitment towards long-term relationships is the only variable to demonstrate a positive relationship with VCI at farmers-traders interface.

On the other hand, collaboration between value chain members and commitment of value chain members towards long-term relationships at farmers-traders interface; collaboration between value chain members, coordination of activities and joint decision making on critical operational and strategic issues at farmers-traders interface; and all VCI constructs at traders-farmers and traders-AMF interfaces have shown no significant influences on VCP. Value chain members hardly envisage any positive relationship between VCI constructs and VCP in the MBVC mainly due to the very low level of information sharing between value chain members; lack of common platform for members to discuss on the importance of VCI constructs to enhance VCP and craft ways for better implementation of the constructs at every tier of the chain; and value chain members' failure to recognize the efforts and contributions made by value chain partners towards the success of the entire value chain.

Therefore, MBVC members should be encouraged to consider VCI constructs as an important strategic means to improve performance. These members need to be aware of the important role that VCI constructs play towards improving VCP though costly to implement and achieve. Moreover, value chain members and policymakers should establish salient “rules of the game” that promote value chain thinking at every tier of the value chain and increase the maturity level of each member concerning VCI practices to revive performance.

6.2. Limitations

This doctoral dissertation faces some methodological limitations and the generalizability of its key findings to the agribusiness value chains in developing countries or even to those in the study country is constrained. Here, we briefly discuss the main limitations and constraints across the four empirical studies presented in chapters 3 through 5.

6.2.1. Methodological limitations

In this doctoral dissertation, we identified three methodological limitations which we have briefly discussed in the following paragraphs.

Firstly, this doctoral dissertation focuses on the key aspects of VCI called constructs throughout the dissertation and the assessment of how these constructs are influenced by key VCS constructs and how they influence VCP (in this dissertation we used the combination of quality, responsiveness, flexibility and efficiency indicators to measure VCP) were modeled using acceptable statistical techniques. Though efforts were put to included several indictors to cover various domains of the value chain structure, integration and performance for comprehensive analysis, still our conceptual framework is far from completeness. The conceptual framework presented in this doctoral dissertation can still be fine-tuned through exclusion of less important indicators in the framework and/or the comprehensiveness of the analysis can be improved through inclusion of more concepts that our conceptual framework overlooked.

Secondly, the cross-sectional characteristic of the empirical data used for all studies presented in this doctoral dissertation precludes strong reliance on the inferred causal associations between our explanatory and outcome variables in each of the studies. The use of longitudinal data on these constructs may lead to different sets of findings in relation to the proposed associations between conceptual constructs. Although most of our specific conceptual frameworks presented in chapters 3 through 5 for each empirical study are theoretically sound and consistent with key propositions forwarded based on literature review and the indications of the case-study presented in chapter two, future research should validate the conceptual framework presented for each study using longitudinal research design. The case study presented in chapter 2 somehow is an attempt to fill the gap create by the cross-sectional data used for the empirical studies.

Thirdly, though sufficient introduction were given to respondents about the confidentiality of the information as it is used solely for academic research purpose to avoid various forms of biases, like desirability bias, traders have still made some desirability bias and suspicions and such problems are common hindrances to data reliability and validity. The less knowledgeable and unexperienced are the value chain members and the lower the level of their value chain thinking, the more it is difficulties for them to understand the concepts and provide suitable responses to the questions in survey questionnaires and interview guides which in effect somehow limits the reliability and validity of our empirical data.

The fact that concepts in the survey questionnaires and interview guides were adapted from past studies from developed countries due to unavailability of similar studies in developing countries was the main drawback of this doctoral research. We improved the clarity of concepts in the survey questionnaires and interview guides through the pilot tests conducted and through discussions and consensus building with senior researchers in our Division of Agri-food Marketing and Chain Management at the Department of Agricultural Economics of Ghent University to tailor them to the level that can easily be understood by the enumerators and respondents to minimize the drawbacks of such limitation.

6.2.2. Generalizability limitations

The findings presented in this doctoral dissertation cannot be generalized to the whole agribusiness value chains in Sub-Sahara Africa or even to the agribusiness sector in the study country due to the following reasons.

Firstly, the scope of this doctoral research was limited to a single malt barley value chain in Ethiopia due to the fact that data collection from more chains was beyond and above our reach given the time and budget allotted for it given the immature and disorganized nature of agricultural value chain in the study country. Though the findings of each study cannot be generalized to other agricultural value chains, it could be generalized to the malt barley value chain at the national level since this chain is the only one organized around a single malt factory that operates in Ethiopia until the establishment of a second new malt factory in June 2013. Even though the scope of the study limits the generalizability of the findings to other agribusiness value chains, the MBVC is deemed suitable to be granted such a high research attention given the involvement of many members within its several tiers from upstream to downstream the chain and the significance of its contributions to the livelihoods of its large number of members and to the overall economy of the nation.

Secondly, the selection of four districts out for twenty three malt barley producing districts in Arsi and West Arsi zones, the collection of survey data from 320 farmers and 100 traders, and the administration of qualitative interviews with 76 malt barley value chain members out of large number of members still constrain the generalizability of the findings even at the national and chain levels. But due to the novel approach used while identifying the districts and selecting respondents for the field survey and key informants for the qualitative interviews, the problems relative with the generalizability of the key findings would have been minimized.

Thirdly, in this doctoral dissertation, we only considered the primary members of an extended MBVC, mainly cooperatives, farmers, traders, the malt factory and to some extent the four major local breweries. The exclusion of beer distributors, retailers and consumers from the analysis for the purpose of manageability of the studies would reduce the full picture of the

MBVC as such. Otherwise, the research went deep into the investigation of how VCI constructs are influenced by VCS constructs and then how VCI constructs in turn influence VCP at several interfaces of the MBVC in Ethiopia.

6.2.3. Other limitations

The fact that this dissertation is the compilation of papers published in different scientific journals led to great deal of repetitions of the methodological, conceptual and background information. I have put a great deal of efforts to reduce repetitions in the doctoral dissertation by combining common methodological, conceptual and background information in the separate papers and presenting them in the introductory chapter. Even then, some repetitions were unavoidable for it is still necessary to establish links between chapters by retaining some of these components and, on the other hand, the combination of common methodological, conceptual and background information in the introductory chapter necessitated frequent referencing of those common items presented in the introductory chapter in the subsequent chapters of the dissertation.

6.3. Policy implications of the key findings

In the absence of strong MBVC integration, the chain continues to suffer from pitfalls arising from weak integration. The production of less quantity and poor quality of malt barley, poor malt barley collection systems, unmeet demands of breweries from local source, and poor quality and high prices of local malt compared to imported malt are some of the pitfalls. This doctoral research clearly indicated that the use of outdated malt barley seeds on fragmented farms greatly contributed to the weak MBVC integration. The MBVC members and their collaborators such as districts agricultural offices, agricultural research institutions/centres, universities, ATA, seed enterprises, funding organizations and other NGOs should make concerted efforts to turn the few MBVC improvement ongoing projects like the CREATE and Meta-Package. The introduction of improved malt barley seeds itself can take the MBVC integration to the next level of strength and performance to the next higher frontier.

The facts that cooperatives are disorganized and ineffective; traders are highly opportunists and are in bad terms with farmers and the malt factory; and the power concertation in the hands of a single malt factory as monopsony and monopoly are the major causes for the poor functioning of the malt barley collection systems. Though the malt barley harvest exceeds the malt factory's demand by many folds in terms of volume, the crop flows to other competing channels due to the above limitations. The MBVC members should fix the weak links in the collection system. A well-structured and -organized malt barley markets should be established to somehow regulate, institutionalize and also support the actions of malt barley buyers and sellers. The malt factory should work towards having a policy that recognizes traders' contributions towards its success. This policy should indicate to the traders the importance of VCI practices to achieve higher and sustainable VCP that is fairly distributed among members. Other MBVC members should push the Ethiopian privatization agency to enforce existing privatization policy to privatize the single publicly owned malt factory and/or the investment policy to encourage the establishment of new malt factories through government or private sector or joint ventures investments to dilute the excess power concentration in the hands of the single malt factory at the moment.

In the absence of well-organized and -structured malt barley markets, there is no reason that the single dominant malt factory pays attractive prices to farmers and traders. Presently, the malt factory pays small marginal prices for malt barley with higher quality grades compared to lower quality grades which discourages the upstream members to work on quality. The minimal price margins paid for additional quality rather motivate farmers and traders to produce and supply low quality malt barley which requires less efforts than to supply high quality malt barley with extra efforts. The small premium paid for higher quality grades has adverse effects on the quality of malt barely supplied to the factory. Therefore, the malt factory should introduce attractive pricing scheme to encourage upstream members (i.e. farmers, cooperatives, and traders) to produce and/or supply more quantity of high quality malt barley to strengthen chain's integration and boost its performance.

It was indicated in this dissertation that MBVC interfaces are not porous for free flow of information back and forth. Some of the chain members, mostly traders, believe in the denial of the right of access to information by other value chain members, particularly farmers, to

exercise opportunism under information asymmetry. Towards this end, traders or their agents remove price catalogues posted for public consumption. The removal of price information leaves the farmers in dark so that they can easily accept very lower prices for their malt barley. Therefore, the malt factory, other MBVC members and the stakeholders should look for ways of protecting farmers' rights to access price and other information so that they can get fair share of benefits from participation in the chain. The right policy should be formulated and enacted to assurance of this rights so as to promote agribusiness value chains as gateways towards economic development of the country.

It was also indicated that the use of both contract and trust in the MBVC as mechanisms to organize transactions have positive influences on chain's integration and performance though some incidences of moral hazard and adverse selection were noted. The improvements of productivity and quality of malt barley through the use of these mechanisms alone can fix most of the observed fragmentations in the MBVC integration that lowered its performance. The use of these mechanisms can only be effective under favorable policy framework. The lack of a policy framework contract formulation and enactment to protect the interests of powerless members was observed as a limitation. Therefore, policymakers should come up with policy instruments that help members of MBVC to craft contract terms that ensure fair distribution of benefits.

The other important key finding of this doctoral research is that MBVC members have low level of awareness as to the importance of VCI constructs to bring about higher VCP outcomes. As a result, these members do not practice VCI or consider its constructs as strategic means to achieve higher VCP outcomes. The MBVC members need to formulate the "rules of the game" that popularize the chain's integration and ultimately enhance its performance. Moreover, the MBVC should establish a "platform for partnership" where all its members meet to discuss on key issues like how to improve information sharing, reinvigorate cooperatives, increase traders commitment, and to draw a roadmap to stronger chain's integration and higher performance outcomes. The platform can, for instance, be named as "Counsel of the MBVC in Ethiopia". The lead MBVC member/s such as the malt factory and breweries and various collaborators should help for the realization of this council.

6.4. Directions of future research

In spite of those narrated limitations under section 6.2, we believe this doctoral research had made preliminary conceptual, empirical and methodological contributions to the literature in the area of value chain management in general and value chain structure, integration and performance in particular with specific relevance to the MBVC in Ethiopia, and thus motivated the needs for future research and actions. In the following paragraphs, some of the future research directions were indicated.

This doctoral research can be taken as a good starting point towards the study of VCI whose strength is assumed to be influenced by VCS constructs and whose constructs, on the other hand, influence the level of VCP. However, the scope of the research is limited in terms of the research setting (single country and single MBVC) and the unit of analysis (only few interfaces in the chain). The limitation in scope of the research in terms of its setting and unit of analysis, in its turn, imposes paramount limitations on the generalizability of the findings of the studies presented in this dissertation to other agribusiness value chains in developing countries. In order to prove high degree of generalizability of the findings of the study or to disprove otherwise, future research should consider the extension of both the research setting and the unit of analysis. For instance, when the research setting is extended, more agribusiness value chains can be included from within the same country or even beyond for wider coverage. Likewise when the unit of analysis is broadened to encompass an ultimate MBVC size, additional members such as beer distributors, retailers, consumers, and other third parties stakeholders such as government institutions, research centers, and financial institutions can be covered for better understanding of the situation and the study topics.

For the purpose of manageability of this doctoral research, we could not investigate how the horizontal relationships among value chain members in each tier influence the strength of the value chain integration and the level of value chain performance, though important. For instance, the horizontal relationships that exist among farmers, among cooperatives and among traders influence the MBVC integration and then performance at those interfaces. The

association between the horizontal relationships within tiers and VCI, though not investigated in this dissertation, is therefore a fertile ground for future research.

Moreover, the study on the structure, integration and performance of the agribusiness value chains similar to those reported in this doctoral dissertation would come up with more robust and highly generalizable findings if longitudinal perspectives of the various interplays between conceptual constructs are based on data sets captured over wider time horizons than the cross-sectional data sets used for this research. Therefore, future research should aim at the use of longitudinal data sets though such data sets are quite difficult to obtain from the settings of agribusiness value chains operating in developing counties.

Summary

This doctoral dissertation is based on the compilation of several research papers investigating the influences of value chain structure (VCS) constructs on value chain integration (VCI). The influences of value chain integration (VCI) constructs on value chain performance (VCP) within the context of the Malt Barley Value Chain (MBVC) in Ethiopia were also examined. Multiple theories under institutional economics and economics of organizations such as transaction cost analysis (TCA), resource based view (RBV) and social capital (SC) were consulted to formulate the general and specific research frameworks, propositions and hypotheses to guide this doctoral research. In this doctoral research, we utilized survey data collected from 320 small-scale farmers and 100 traders (i.e. through the conclusive data collection method) along with interview responses captured from 65 members of the MBVC in Ethiopia (i.e. through the use of exploratory data collection method). Descriptive statistics (such as medians, percentages and interquartile ranges) and advanced statistical methods (such exploratory factor analysis, ordered logistic regression and structural equation modeling) were used for data analyses.

Firstly, we analyzed the overall situation of the malt barley value chain using a case study approach. The aim of the case paper was to conceptualize value chain structure, integration and performance and the sequential relationship between these constructs based on intensive literature reviews and interview responses obtained from the members of the MBVC in Ethiopia and to formulate key propositions for further investigation in the subsequent chapters of the dissertation with the help of specified empirical research methods design for each chapter. Secondly, information sharing between MBVC members and its integrative role was thoroughly investigated. Thirdly, the doctoral research has also given considerable amount of emphasis to the investigation of how transaction attributes and governance mechanisms in the MBVC influence the chain's integration for which theoretically grounded mechanisms and attributes were used. Fourthly, the dissertation also highlighted how each VCI constructs are correlated with value chain performance which we measured through the use of combined median values of its indicators, namely: quality, responsiveness, flexibility and efficiency.

The key findings of this doctoral dissertation show that there are several fragmentations in the MBVC structure whose combined effect weakens the chain's integration and lower both individual members' and overall chain's performances. The dissertation also revealed low level of information sharing between the members of the MBVC chain both in terms of volume and quality of information being shared and the frequency of channels use to share information. The low level of information sharing in turn has constrained the strength of the chain's integration at the various studied interfaces since information sharing between value chain members is noted to play key roles in strengthening the value chain integration though its multifaceted constructs were not studied as such.

Besides, this doctoral dissertation concluded that both contract use and existence of trust between MBVC members positively relate to the intensity of strength of the chain's integration. Transaction attributes, on the other hand, showed varied influences on the strength of chain's integration at the studied interfaces. It is strange that asset specificity negatively relates to VCI at farmers-traders interface based on traders' data set contrary to the proposed positive relationship. This finding was, in fact, justified by interviewed farmers who expressed negative impressions towards traders for accumulating more assets (both specific and non-specific) which the farmers assume to result from the act of opportunism. Moreover, interviewed farmers have also the view that traders mishandle them as they keep on accumulating more and more assets (both specific and non-specific) which weakened integration between farmers and traders.

This doctoral dissertation also witnessed that, contrary to the proposed positive relationships, VCI constructs failed to demonstrate the proposed positive influences on VCP at the studied interfaces. Even though further studies should be conducted to identify the detailed causes for the failure, this doctoral research hinted some of them. The poor information sharing, low level of value chain thinking, negligence to recognize the contributions of other value chain members, failure to consider VCI constructs as strategic means to improve performance, and absence of platform for partnership among MBVC members are some of the causes for the lack of empirical supports for those proposed hypotheses.

Therefore, this doctoral dissertation would contribute enormously to the better understanding of the structure, integration and performance of the agribusiness value chains in general and the MBVC in Ethiopia in particular. It organized the most important constructs and concepts of this structure-integration-performance paradigm and also analyzed the interplays between these constructs at the various interfaces of the MBVC in Ethiopia. Moreover, this doctoral research can be taken as a novel scientific approach to study the structure, integration and performance of any agribusiness value chains, mostly in the context of developing countries. Therefore, we suggest the application of our conceptual framework or any of its modified versions to the wider scope and complex structure of the agribusiness value chains in Ethiopia or even beyond for more robust and generalizable findings.

Samenvatting

Dit doctoraal proefschrift is gebaseerd op de samenstelling van meerdere artikelen die de rol van constructen van de waardeketenstructuur op de waardeketenintegratie (WKI) onderzoekt. Daarnaast wordt de invloed van waardeketenintegratie constructen op de waardeketen performantie (WKP) bestudeerd binnen het kader van de malt gerst Waardeketen (MGWK) in Ethiopië. Meerdere theorieën onder institutionele economie en de economie van de organisaties, zoals transactie kostenanalyse, resource-based view en sociaal kapitaal werden geraadpleegd om de algemene en specifieke onderzoek kaders, stellingen en hypothesen te formuleren in dit doctoraatsonderzoek. In dit doctoraatsonderzoek, onderzoeksdata werd verzameld van 320 kleine boeren en 100 handelaars (gebruikmakend van een conclusieve dataverzamelingsmethode), gecombineerd met interviews van 65 leden van de MGWK in Ethiopië (gebruikmakend van een exploratieve dataverzamelingsmethode). Beschrijvende statistiek (zoals de mediaan, percentages en interkwartielafstand) en geavanceerde statistische methodes (zoals exploratieve factoranalyse, besteld logistische regressie en structural equation modeling) werden gebruikt tijdens data-analyse.

Ten eerste werd de algemene situatie van de mout, gerst waardeketen met behulp van een casestudy aanpak geanalyseerd. Het doel van deze casestudy was om de waardeketenstructuur, de integratie en de prestaties en de sequentiële relatie tussen deze constructies gebaseerd op literatuuronderzoek en interview reacties te conceptualiseren. Daarnaast werden belangrijke voorstellen voor verder onderzoek geformuleerd voor de daaropvolgende hoofdstukken van het proefschrift met de hulp van gespecificeerde empirische onderzoeksmethoden ontwerp voor elk hoofdstuk. Ten tweede werd het delen van informatie tussen MGWK leden en haar integrerende rol grondig onderzocht. Ten derde heeft het doctoraatsonderzoek nadrukkelijk onderzocht op welke manier waarop het transactie bestuur en attributen van de MGWK invloed hebben op de integratie van de keten, theoretisch onderbouwde transacties bestuur mechanismen en attributen. Ten vierde, het proefschrift bepaald tevens hoe de WKI constructen gecorreleerd met de waardeketen die werden gemeten met behulp van

gecombineerde mediane waarden van de indicatoren, namelijk: kwaliteit, reactievermogen, flexibiliteit en efficiëntie.

De belangrijkste bevindingen van dit proefschrift tonen aan dat er verschillende fragmentaties in de MGWK structuur zijn waarvan het gecombineerde effect de integratie van de keten verzwakt en leidt tot een lagere individuele en totale ketenperformantie. Uit dit proefschrift blijkt ook het lage niveau van informatie-uitwisseling tussen de leden van de MGWK keten, zowel in termen van volume als de kwaliteit van de informatie die wordt gedeeld. Het lage niveau van informatie-uitwisseling heeft de sterkte van de ketenintegratie beperkt op de verschillende bestudeerde onderdelen gezien het delen van informatie tussen de waardeketen-leden een belangrijke rol speelt in de versterking van de waardeketenintegratie.

Daarnaast volgt ook de conclusie dat zowel het contractgebruik als het bestaan van vertrouwen tussen MGWK leden een positieve impact hebben op de sterkte van de ketenintegratie. Transactie kenmerken, daarentegen, toonden verschillende invloeden op de sterkte van ketenintegratie bij de bestudeerde interfaces. Het is opmerkelijk dat de vermogen specificiteit negatief gerelateerd is aan de WKI bij de boeren-handelaars interface op basis van gegevens van handelaren. Deze bevinding werd in feite verklaard door de geïnterviewde boeren die negatieve indrukken hebben geuit in de richting van handelaren die meer vermogen (zowel specifieke en niet-specifieke) accumuleren waarbij de boeren uitgaan dat deze vermogen accumulatie het resultaat is van opportunisme. Bovendien, waren de geïnterviewde boeren van mening dat de handelaren hen slechter behandelen naarmate ze vermogen (zowel specifieke en niet-specifieke) accumuleren. Dit leidde aldus tot een verzwakking van de ketenintegratie tussen boeren en handelaren.

Dit proefschrift vond dat, in tegenstelling tot de voorgestelde positieve relaties, WKI constructies er niet in slagen de voorgestelde positieve invloeden op de WKP bij de aan te tonen bij de onderzochte performanties. Verder onderzoek moet worden uitgevoerd om de gedetailleerde oorzaken te identificeren voor het gebrek aan empirische ondersteuning voor deze hypothesen. Het weinig delen van informatie, het lage niveau van waardeketen denken, het niet erkennen van de bijdragen van de andere leden waardeketen, het falen van

waardeketen leden om te overwegen dat WKI constructen de WKP verbeteren, en het ontbreken van een gemeenschappelijk platform voor het ontmoeten van MGWK leden kunnen mogelijks de oorzaken zijn voor het gebrek aan statistisch voldoende empirische ondersteuning voor de voorgestelde relaties.

Dit proefschrift draagt bij tot een beter begrip van de structuur, de integratie en de prestaties van de agrobusiness waardeketens in het algemeen en de MGWK in Ethiopië in het bijzonder. Het heeft belangrijk constructen en concepten van deze structuur-integratie-performance paradigma geformuleerd en analyseerde de wisselwerking tussen deze constructen op de verschillende interfaces van de MFWK in Ethiopië. Bovendien kan dit doctoraatsonderzoek worden opgevat als een nieuwe wetenschappelijke benadering van de structuur, de integratie en de prestaties van elke agrobusiness waardeketens bestuderen, meestal in het kader van een ontwikkelingsland. Daarom wordt het gebruik van dit conceptueel kader of de gewijzigde versie aangeraden, maar in een breder toepassingsgebied en complexere structuur van de agrobusiness waardeketens in hetzelfde land of zelfs daarbuiten voor meer robuuste en algemene bevindingen.

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Curriculum Vitae

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Educations

Since 2012:	PhD scholar at the Division of Agri-food marketing and Chain management, the Department of Agricultural Economics, Faculty of Bioscience Engineering, Ghent University, Belgium
2003:	Master's degree in Business Administration (MBA) from the Addis Ababa University, Ethiopia
MBA Project:	Determinants of employee performance in the financial institutions in Ethiopia
1997:	BA degree in Accounting and Finance from the Addis Ababa University, Ethiopia

Work experience

Since 2003:	Lecturer both at the College of Business and Economics (CoBE) and College of Agriculture and Natural Resources (CANR), Haramaya University, Ethiopia
2007-2012	Dean, College of Business and Economics, Haramaya University, Ethiopia
1998-2001	Graduate Assistant, College of Agriculture, Department of Agricultural Economics, Haramaya University, Ethiopia
1998-1999	Head, Procurement Department, Haramaya University, Ethiopia

Short-term trainings delivered	
August 20-30, 2011	Financial Management and Project Analysis and Management to experts from various offices organized by the Bureau of Agriculture, Harari National Regional State, Ethiopia
March 10 to 13, 2011	Purchasing and procurement management, Internal Audit, Records and Archives Management, Office Operations Level I and General Accounting to experts from various offices of the Dire Dawa City Administration Council at Grand Triangle Hotel, Dire Dawa, Ethiopia

Short-term trainings attended	
Sept. 14-18, 2015	Plunge into Your Own Business Plans, Ghent University, Belgium.
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March 15-19, 2010,	Leadership and Management Development, North-West University, South Africa.
July 29 –Sept. 02 , 2006	Regional Development Planning, a ToT training, Ministry of Finance and Economic Development (MoFED) and Capacity Building Program of German Technical Cooperation (GTZ) at Addis Ababa University, Ethiopia.
Sept. 20-30, 2005	Advanced Project Management, Management for Development Foundation (MDF), the Netherlands, at Lalibela Hotel, Lalibela, Ethiopia.
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- Watabaji, M. D., Molnár, A., and Gellynck, X. (2016). Situations analysis of the malt barley value chain integration and performance in Ethiopia. *Outlook on Agriculture 4m5*(3): 158-64
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- Watabaji, M. D., Molnár, A. and Gellynck, X. (2016, 08-09 December). Situations analysis of the malt barley value chain integration and performance in Ethiopia. The 10th symposium of Ghent Africa Platform (GAPSYM10), Ghent, Belgium.
- Watabaji, M.D., Molnár, A., Gellynck, X. (2015, 2-3, December). Value Chain integration as a fit between structure and performance: A situation analysis of the Malt Barley Value chain in Ethiopia. Value Chain Management Seminar, Adama, Ethiopia.
- Gellynck, X., Watabaji, M. D., Molnár, A., and Dora, M.K. (2015, 09-13, February). Information sharing: the case of the malt barley value chain in Ethiopia, 9th International European Forum on System Dynamics and Innovation in Food Networks, Innsbruck, Austria.
- Watabaji, D. M., Molnár, A., Dora A. K. and Gellynck, X. (2015, 23-24, September). Value chain governance and its influence on integration: Evidences from the malt barley value chain in Ethiopia, International Conference of Agriculture for Development, Uppsala, Sweden**.**

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